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AGRA

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6. Prem Singh Raizada, "Radio Meteorology", for D.Phil.

7. Indra Dev, "Study of Spectra of some Molecules", for D.Phil.

8. Karuna Sagar Srivastava, "Ultrasonics and Chemical Constitution," for D.Phil.

9. Satya Prakash Srivastava, "Chemical Kinetics", for D.Phil.

10. Ram Gopal Agarwal, "X-Ray Study of Structure of Alloys," for D.Phil.

11. Niranjan Das, "Investigations into Mechanism of Photo-periodic response," for D.Phil.

12. Ratan Kumar Tandon,"Studies in Ecology of Water Plants," for D.Phil.

13. Prem Swarup, "Micro-wave Spectroscopy," for D.Phil.

14. Mahesh Kishore, "Studies in Micro-waves," for D.Phil.

15. Jagdish Narain Verma, "Physiological and Ecogical Studies on certain Algae," for D.Phil.

16. Atharul Hasan, "Studies in Yeasts," for D.Phil.

17. Kunwar Raghubansh Bahadur, "Nitrogen Transformation," for D.Phil.

18. Ravi Prakash, "Studies on some Soil Fungi," for D.Phil.

19 Aditya Narain Tewari, "Astro-Physics," for D.Phil.

20. Jawand Singh Grewal, "Cultural and Pathological Studies of some Fungi causing diseases of Fruit and vegetables," for D.Phil.

21. Dharma Prakash Gupta, "Theory of Infinite Series," for D.Phil.

22. Durga Charan Chatterji, "Theory of Functions of Real, Variable and Infinite Series," for D.Phil.

23. Pyare Mohan Agarwal, "Theory of Functions of Real, Variable and Infinite Series," for D.Phil.

24. Om Prakash Varshney, "Summability of Infinite Series," for D.Phil.

25. Radhey Shyam Gupta, "Convergence and Summability of Infinite Series," for D.Phil.

26. Jagdish Prasad Srivastava, "Plant Succession and Antecological Studies," for D.Phil.

27. Ramesh Kumar Srivastava, " Legumes and Soil Fertility," for D.Phil.

28. Indu Gupta, " Synthesis of some organic Compounds and their Substituted Analogous Naturally Occurring Substances." for D.Phil.

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31. Santosh Kumar Ghosh, "Fixation of Nitrogen," for D.Phil.

32. Sita Ram Gupta, " Study of Precipitation and Colloid Formation of Some Insoluble Substances," for D.Phil.

33. Upendra Kumar Rai, "Cytogenetical Studies of Crop Plants," for D.Phil.

34. Ganga Prasad Agarwal, " Cultural and Pathological Studies of Some Fungi Imperfecti," for D.Phil.

35. Bikrama Jeet Srivastava, "Problems in the Theory of Viscous and non-Viscous Fluids," for D.Phil.

36. Vireshwar Nath Kapoor, "Entomology," for D.Phil.

37. Ram Kishore Srivastava, "Biology and Bionomics of Aphids," for D.Phil.

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ANDHRA

(1950-51)

Colleges of Arts and Commerce

Philosophy

1. Prof. Sailcswar Sen, M.A., D.Litt. et. D.Phil.

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2. K. Satchidanandamurthy, M.A.

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Mathematics

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3. T. V. Avadhani, B.A. (Hons.)

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History and Politics Department

1. Prof. G. Venkatarao, M.A., LL.B.

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Economics and Sociology

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5. Dr. S. Rajagopalan, M.Sc., D.Sc., A.R.I.C. (Lond.)

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Technology

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5. M. V. Raghavacharya, M.Sc.

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Erskine College of Natural Sciences

Geology

1. Dr. M. Srirama Rao, M.Sc., Ph.D. (Glas.), F.G.S., F.R.S.E.

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2. A. Sreerama Das, M.Sc.

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3. M. Pooranchandrarao, M.Sc.

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4. G. V. Umamaheswararao, M.Sc.

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7. C. Venkata Rao, M.Sc.

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Andhra Medical College, Visakhapatnam

(*a*) Dr. T. K. Raman, Dr. B. Rama Murthy, Dr. S. Pinakapani, Hetrazan in the treatment of filariasis, Papers published in Indian Medical Association, February 1950.

(*b*) Dr. T. K. Raman, Dr. B, Ramamurthy, Dr. C. V. David, Cysticercosis, Papers published in Indian Physician, 1950.

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(*g*) Dr. P. Narasimha Rao, The Tonsil problem, Papers published in The Anti Septic, Madras.

(*h*) Dr. O. Francis, Certain aspects of Accidental Haemorrhage, Papers published in All India Journal of Obstetrics and Gynaecology Vol. I & II, December 1950.

(*i*) Dr. B. Naganna, Erythrocyte Pysophosphatase in health and diseases II Reversible and irreversible Inactivatons of the Enzyne, Papers published in Journal of Biological Chemistry—April 1950.

(*j*) Dr. S. N. Gantayat and Dr. T. K. Raman, Neutonuyelitisa, optic Papers published in Journal of Biological Chemistry—April 1950.

(*k*) Dr. M. V. Krishnamurthy, Lab. in the Modern Diagnosis and Treatment of Venereal disease, Papers published in Indian Journal of Venereal diseases, 1950.

(*l*) Dr. A. R. Govinda Rao, Intravenous Procaine in Surgery, Papers published in Anteseptic.

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Government Training College, Rajahmundry

1. Janab T. Abdur Rahman, Assistant Lecturer in Social Studies, "Work in the Early History of the World."

Andhra Christian College, Guntur

1. N. Isaac, M.A., Lecturer in History, Andhra Pre-History and Regalithic monuments with special reference to Kurnool Dt.

College of Arts and Commerce

Philosophy

(1951—52)

1. Prof. Saileswar Sen.

(*a*) A note of the Yogacara-sautrantika Theory of Error, Paper published in Hiriyana Commemoration Volume.

(*b*) A note on the Catagory of Existence.

2. K. Satchidanandamurti.

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Economics and Sociology

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2. D. V. Ramana.

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(*b*) Vindication of the Mastya list of the Andhra Kings, Paper published in Proc. of Ind. Hist. Cong., Nagpur session.

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3. Dr. O. Ramachandraiya.

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English

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(*a*) Comparative poetics, Papers published in Studies.

(*b*) Logical Positivsm, Papers published in Studies.

3. D. V. K. Raghavacharyulu.

Bensalem Revisited, Papers published in Studies.

Telugu

1. Prof. G. J. Somayaji.

Saivacharasangraham, Published a book for the Government of Madras.

2. Bh. Krishnamurty.

On " the origin of Yokka in Telugu " Paper communicated to Oriental Conference.

Commerce

1. H. K. Datta.

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(*b*) Booklet entitled " Problems of State participation in Industry in India."

2. K. S. Hanumantarao.

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2. P. Sambasivarao.

On the Volume of a tetrahedron, Paper communicated to Math, Student.

J. Y. D. College of Science and Technology.

Statistics

1. Dr. K. Nagabhushanam.

(*a*) Linear Transformation and the product—Moment-Matrix, Papers published in Annals, Math Stat. 1951.

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Physics

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Mathematical Physics

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Erskine College of Natural Sciences

Botany

1. Prof. J. Venkateswarlu.

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(*b*) Embryological studies in Lecythidaceae I, Papers published in Jour. of the Ind. Bot. Soc. (in press).

2. P. V. V. Seshagiri.

T. A. N, Changes in *Tamarindus Indica*, Papers communicated to Curr. Sci. Aug. 1952.

3. C. Venkatarao.

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(*b*) Contributions to the Embryology of sterculiaceae. III, Papers published in Jour of Ind. Botan. Soc. Vol. 30, 122-131, 51.

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(*b*) On a new Crithidia from a pentatomid bug *Dysdercus* sp., Papers published in Proc. Ind. Sci. Con. 1952.

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2. K. Krishnan Nair.

(*a*) Medusae of the Trivandrum coast, Papers published in Bul. of the Central Res. Inst. Univ. of Travancore.

(*b*) On the tubular ova of the South Indian Rodent *Bandicota Malabarica*, Papers published in Curr. Sci. Vol., 21, 1952.

3. T. S. Satyanarayanarao.

Occurrence of *Lerneenicus* sp. on *Scomber Scomber*, Lawson's Bay, Waltair, Paper published in Curr. Sci. Vol. 21, 1952.

Geology

1. Prof. C. Mahadevan.

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(*e*) Color of Blue Quartz, Papers communicated to Proc. Ind. Acad. Sc.

2. Dr. M. Srirama Rao.

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4. B. J. N. S. Anjaneyulu.

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(*b*) Geology of the coastal strip from Vizagapatam to Pudimadaka with special reference to Black sand concentrates, Paper communicated to Quar. Jour. of Min. and Met. Soc. India.

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On the benefication of manganese oxide ores from parts of Vizagapatam. Dt. P. I. Paper communicated to Q. J. G. S. of India.

6. J. S. R. Krishnarao.

(*a*) An abstract on Manganese garnets from Chipurupalle area, Vizagapatam district, Paper published in Proc. of Ind. Sci. Cong. 1952.

(*b*) Geology of the Chipurupalle area, Vizagapatam District, with special reference to the origin of Manganese ores, Paper communicated to Q. J. of Min. and Met. Soc. of India.

7. M. Poornachandrarao.

The paper on " The correlation of Gondawanas of the Guntur Dt." by sedimentary petrographic methods, Paper communicated to Q.J. of Geo. Min. and Met. Soc. of India (Under publication).

College of Law

1. Prof. S. Venkataraman.

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(ii) Hindu Law Reform, Papers published in Triveni, October, 1951.

(iii) The principle on Weizz's Case, Papers published in (1922), M.L. Jour.

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Medical College, Visakhapatnam

Bio-chemistry

1. P. Venkateswarlu, Experimental Fluorosis.

Pharmacology

1. Dr. A. R. Govinda Rao.

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(ii) The Chemotherapy of Filariasis Published in Antiseptic, Feb. 1952.

(iii) A Preliminary communication on the action of folic acid on the Isolated intestine of Guinea pig., Published in Ind. Jour. Med. Sci., Bombay, Feb. 1952.

Pathology

1. Dr. C. Ratnavathi, Evaluation of exfoliative cytology in the diagnosis of carcinoma uterus.

Venereal

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1. Dr. M. V. Krishnamurthy.

(i) Pomphigus and the newer antibiotics, Published in I.J.V.D., Dec. 1951.

(ii) L. G. I. and its recent trends in diognosis and treatment (with special reference to virus culture and complement fixation tests), Published in J. I. M. A., May, 1952.

(iii) Aureomycin in Venereology and Dermatology Practice, Published in I.J.V.L.

Forensic Medicine

1. Dr. D. Jagannadha Reddy, M.D.

(*i*) Appendicitis with a typical clinical features, Published in Antiseptic.

(*ii*) Amyloidosis, Published in I. M. G.

(*iii*) Foetal hydrops unassociated with Erythroblastosis, Published in Ind. J. of Obst. & Gynace.

(*iv*) Renal Vein Infraction and Thrombosis, published in Ind. J. of Obst. & Gynace.

(*v*) Spontaneous cardiac lesions in rabbits, published in Ind. J. Med. Sciences.

(*vi*) Spontaneous Bronnchial adenoma in Guinea pigs, published in The Indian Physician.

Medicine

Clinical Research was carried out on fluorosis, beriberi, cardivascular diseases and intravenous therapy. In collaboration with the Professor of Opthalmology fundamental changes in hypertension is being studied.

6. Dr. T. K. Raman, M.D.D.,T.M. (Cal.).

(*i*) Cysticercosis, published in Indian Physician, Vol. 9. p. 207—222.

(*ii*) Streptomycin, in Penicillin resistant bacterial endocarditis, published in Indian Heart Journal, September 1951.

(*iii*) Neuromyelitis optica, published in Indian Physician, Vol. 9 page 290—300.

(*iv*) Auricular Fibrillation, published in Indian heart Journal, 1951.

Neurological problems in India and on intravenous therapy.

7. Dr. G. V. Satyanarayanamurthi, M. D.,

Therapeutics

8. Dr. Sree Ramachari Research Scholar (Cirrhosis of liver).

Agricultural College, Bapatla

1. M. Srinivasan, Lecturer in Agricultural Economics, Remarks on the report of Rural Banking Enquiry Committee, Published in Indian Co-operative Review, January-March 1951.

2. K. Suryanarayana, Teaching Asst. in Agrl. Economics, An economic survey of the production and Marketing of Mangoes in Visakhapatnam Dt., Published in Madras Agricultural Journal—October 1951.

3. M. Satyanarayana, Senior Lecturer in Agriculture, Interaction of the Productive Factors in Rice, Published in Madras Agricultural Journal—1951.

4. M. R. Balakrishnan, Irrigation Experiments in the Tungabhadra, To be published as a bulletin.

5. M. R. Balakrishnan, Sri D. Narayanarao, Sri B. Appajirao, Sri T. Seshagirirao, Composition of well waters in coastal areas, For publication in Madras Agricultural Journal.

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P. R. College, Kakinada

1. Vidwan Bulusu Venkateswarlu.

(a) Bhatta Narayunude Narayana Bhatta, Papers published in Bharathi, Madras.

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(c) Yagna Phalam :—Bhasuni Pratibhaviseshamulu, Papers published in Bharathi, Madras.

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(e) Yajna Phalam, Papers published in Bharathi, Madras.

(f) Arundhati Vasisthamu, Papers published in Telugu Academy, Kakinada.

2. Bulusu Venkateswarlu, Yajna Phalam :—

(a) A genuine work of Bhasha, Papers communicated to Journal of the Bhandarkar Oriental Research Institute, Poona.

(*b*) Bhatta Narayana and Narayana Bhatta are the names of a single individual, Papers communicated to Journal of the Bhandarkar Oriental Research Institute, Poona.

M. R. College, Vizianagaram

1. V. Lingamurthi, Lecturer in Politics.

(*a*) Parliamentary Government and Political Parties, Papers published in Swatantra, Vol. VI No. 48, January 1952.

(*b*) Integration of Indian Estates, Papers published in A. U. Colleges, Magazine Vol. XII, 1951-52.

2. J. V. Pantulu, Lecturer in Botany, Studies in Caeslpiniaceae, II Development of the Endosperm and Embryo in *Cassia occidentalis*, Papers published in J. of Ind. Bot. Soc. Vol. XXX, April 1951.

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(*c*) Rationalisation of Industries in India (Read at the All India Commerce also), Papers published in I. J. of Commerce Vol. IV, Part IV, No. 16, (Con. Number Allahabad).

4. K. S. Venkateswarlu, Demonstrator in Chemistry, Zinc hydroxide—its precipitation with alkali and its solubility in aqueous ammonia, Papers communicated to Journal of the Ind. Chemical Society.

5. K. Subha Rao, Head of the Mathematics Department, Papers communicated to Some properties of Arithmetic Progressions.

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Gudivada College, Gudivada

1. B. S. M. Dutt, On the occurrence of monoecious Balanophera Polyandra Griff in the Visakhapatnam Dt., Paper communicated to Science and Culture.

2. B. S. M. Dutt.

(*a*) A case of heterophylly in Astera cantha longifolio. Nees Hygrophila spinosa T., Papers communicated to Journal of. Bombay, Natural History Society.

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Mathematics

1. M. R. Parameswaran, Some converse theorems on Summability, for Ph.D. Published in the Proceedings of the Indian Academy of Sciences, Vol. 36, Sec. A, pages 363—369.

2. Dr. K. Rangaswamy, On a Steiner's Quartic Surface, for Ph.D. Published in the Ganita, VII—2, No. 2, 1952.

3. Dr. K. Rangaswamy, On a quartic Curve associated with a Tetrahedron, for Ph.D. Published for 18th Conference of the Indian Mathematics Society, Bombay, in December, 1952.

Tamil

1. M. Elayaperumal, Poetical Works of Kavimani Desikavinayakam Pillai, for Ph.D.

Zoology

1. Miss V. R. Meenakshi, A thesis on ' Physiology of Digestion in some Gastropodes'. Awarded the M.Sc. Degree.

2. K. Ramamurthi, A thesis on the 'Comparative Embryology of Melaniidae, Awarded the M.Sc. Degree.

3. T. S. Balasubramaniam, Embryology of Ariophanta bistialis—Development of external form, for Ph.D. Published in the Annamalia University Journal, Volume XVII, 1952.

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Botany

1. Dr. T. C. N. Singh and V. R. Rajagopalan, Osmotic concentration in relation to sterility in certain Angiospermic plants, for Ph.D. Published in the Botaniska Notiser, (Sweden).

2. Dr.T.C.N. Singh and V.R. Rajagopalan, Ammonia Treatment of plant sections to enhance differentiation and Permanency, for Ph.D. Published in Stain Technology, New York.

3. Dr. T. C. N. Singh and S. Kalyanasundaram, On the occurrence of tri-compellary Gynoecia in certain genesa, for Ph.D. Published in Journal of Indian Botanical Society.

4. C. Lakshmanan, Observation on the Tesotology of Plants 1, for Ph.D. Published in Annamalai University Journal.

5. Dr. T. C. N. Singh, On the effect of second transplantation on earliness and yield of chilly (Capacium annual crop), for Ph.D. Published in Bihar Academy of Agricultural Sciences.

6. Dr. T.C.N. Singh and N.S. Subba Rao, On the occurrence of Bacteria in Bryophytes and gymnosperms, for Ph.D., Published in Current Science.

7. Dr. T.C.N. Singh, On the biological eradication of Kans, for Ph.D., Published in Kisan Shetkari.

8. A. T. Natarajan, Studies in the Morphology of Pollen grains (Tubi-floare), Awarded the M.Sc. Degree.

9. V.R. Rajagopalan, Part I--The Ecological Adaptations of the Mangrove Vegetation at Pichavaram. Part II—The Cytological Studies in Combre Taceae, Awarded the M.Sc. Degree.

Chemistry

1. V. Gopalakrishnan, Synthesis of some Piperidine derivatives of possible Therapeutic Value, Awarded the M.Sc., Degree.

Philosophy

1. R. Ramanujachariar, Studies in Padmapada's Pancapadika, for Ph.D. Awaiting publication.

Tamil

1. Dr. A. Chidambaranatha Chettiar, Tamil Urai Nadaijil Maru Malarchi, for Ph.D., Published in "Tamil Naidu" Deepavali Malar.

2. Dr. A. Chidambaranatha Chettiar, Tamil Natin Ma Paruntalaibar, for Ph.D., Published in Dr. R.K. Shanmukham Chettiar Commemoration Volume.

3. E. S.Varadaraja Ayyar, Samain Ani, for Ph.D., Published in Sen Tamil, Madura.

4. E. S. Varadaraja Ayyar, The Kurinji Girl, for Ph.D., Published in Annamalai University Journal.

5. E. S. Varadaraja Ayyar, The Marutam Girl, for Ph.D., Published in Annamalai University Journal.

BOMBAY

Anjuman-i-Islam Urdu Research Institute

Urdu

1. G. N. Divekar, M.A., Urdu Mathnavi Writer of Golcanda, for Ph.D., completed in 1953. (Development of Urdu or Deccani Urdu under the Golkonde kings who themselves were good poets and patrons of learning and literature.)

2. S. H. Ansari, M.A., Maulana Abdul Halim Sharar, for Ph.D., completed in 1953. (Maulana Sharar holds a very high position as a novelist and historian.)

3. Hamidullah Nadvi, Urdu Mss. in Bombay Public Libraries, completed in 1953. (A discriptive catalogue of all the Urdu Mss. in the various libraries of Bombay.)

4. N. A. Nadvi, M.A., Popular Mathnavies in Gujerat and the Deccan, completed in 1953. (A large number of such mathnavies has remained unnoticed. They are for the first time being edited.

Bharatiya Vidya Bhawan

Sanskrit

1. Miss K. K. Munshi, Professor, Sringaramanjari, for Ph.D., begun in July 1945 ended in October 1951.

2. Miss Vasumati C. Parikh. Puranas: Their Influence on Indian Life and Thought, for Ph.D., begun in April 1951.

3. Mahendra Ambalal Upadhyaya, Matsya Purana—A Critical study, for Ph.D., begun in November 1950.

4. Padmanabh Tapishanker Deve, Shankra—Evaluation of his works in the Regeneration of Sanatan Dharma, for Ph.D., begun in December 1951.

Sanskrit Ardhamagadhi

1. Prof. H. C. Bhayani, Paumacariu, for Ph.D., begun in July 1941 ended in December 1951. Published by Bharatiya Vidya Bhawan, Bombay-7.

Sanskrit Ancient Indian Culture

1. Miss Najoo Phiroze Billimoria, Social conditions as narrated in the Puranas, for Ph.D., begun in February 1952.

Iranian Culture

1. Burjor Dossabhai Daboo, Some Aspects of Iranian Studies, for Ph.D., begun in October 1946 ended in January 1952,

Bombay Veterinary College

Zoology

1. F. S. Khambata, Professor of Animal Husbandry and Dairy Science, Cestodes of Marine Fishes of Bombay, for Ph.D., begun in 1948, Completed in 1952 but may be continued further. (Worked out 42 species of cestodes from Marine Fishes of Bombay. Out of these, 29 species and one genus are new to Science. Keys to 20 genera have been appended. Figures and sections total 258.)

Chemical Technology

1. R. V. Talavadekar, Cyanurated and other Azoic dyes, for Ph.D., begun in 1945 ended in January 1951, Published in Proc. Ind. Acad. Sci. 1950, 32, 292. (Azoic dyes containing the triazine ring have been synthesized. The absorption spectra of cyanuric acid derivatives have been determined and discussed.)

2. T. S. Gore, Some aspects of complying with diazonium salts and the constitution of citrinin, for Ph.D., completed in October 1951, Published in Nature, 1946, 157, 333 J.A.C.S., 1948, 70, 2287. Proc. Ind. Acad. Sci., 1948, 29, 289, *Ibid*, 1951, 34, 368. Curr. Sci., 1950, 19, 20. (The influence of chelation in azophenols in relation to chromatographic absorbability on alumina has been discussed. The action of diazonium salts on citrinin has been studied and the reaction utilized for determining the constitution of this antibiotic.)

3. B. S. Joshi, A synthesis of islandicin and other anthraquinone colouring matters, for Ph.D., begun in 1947 ended in November 1951, Published in Proc. Ind. Acad. Sci., 1950, 32, 201. *Ibid.*, 1950, 32, 348. *Ibid.*, 1951 34, 304. (Islandicin, and anthraquinone colouring matter produced by Penicillium islandicum, has been synthesized. The constitution of certain anthraquinoneacridone vat dyes has been determined by synthesis and degradation.)

4. P. N. Pandit, Benzanthrone derivatives, for Ph.D., begun in 1947 ended in January 1952, Published in Proc. Ind. Acad. Sci., 1950, 32, 29. *Ibid.*, 1950, 32, 39. (The constitution of Indanthrene Black B has been investigated. The structure previously assigned to Bally's benzanthronequinoline has been shown to be erroneous, and its correct structure has been demonstrated.)

5. K. M. Agashe, Surface active chemotheraphenticals, for M.Sc. (Tech.), begun in 1948 ended in February 1952. (Salts of wetting agents with sulphanlamides and with diaminodiphenyl sulphone have been prepared and their antibacterial properties studied.)

6. S. P. Chandavarkar, Sulphurised anthraquinone vat dyes, for M.Sc. (Tech.) begun in 1948 ended in April 1952. (The constitution of Cibanone Yellow R and Cibanone Orange R has been investigated.)

7. D. S. Bhate, Antitubarcular and antifilarial compounds including some with surface activity, for Ph.D., begun in 1948 ended in February

1953, Published in Proc. Ind. Acad. Sci., 1949, 29. 196, *Ibid,* 1950 32, 357. (A process for the preparation of PAS has been developed and numerous derivatives of PAS have been described. The synthesis of the naphthalene analog of PAS is nearing completion. Numerous antimonials possessing surface activity have been prepared and examined as antifilarial agents.)

8. Miss M. D. Bhavsar, Constitution of sulphurised Vat dyes, for Ph.D., begun in 1951 likely to be completed in 1954. (The constitution of Cibanone Yellow R and Cibanone Orange R is under investigation.)

9. P. Jayaraman, Anthraquinone Vat dyes, for Ph.D., begun in 1948 ended in 1953. (The constitution of chlorinated indanthrones and of Vat dyes of the anthraquinonecarbazole type is under investigation.)

10. S. S. Malhotra, Benzanthrone derivatives, for Ph.D., begun in 1950 likely to be completed in 1954. (5-Aminobenzanthrone and its derivatives have been prepared by a simple procedure. Work on the constitution of Indanthrene Black B is in progress.)

11. Netar Parkash, Anthraquinone derivatives, for M.Sc. (Tech.), begun in 1951 likely to be completed in 1954. (The constitution of pyrazolanthrone dyes is under investigation. Methods of degradation of anthraquinonoid vat dyes are being developed.)

12. N. R. Rao, Some experiments on the Chromatography, absorption spectra and substantivity of dyes, for Ph.D., begun in 1947 ended in December 1952, Published in Curr. Sci., 1950, 19, 149 *Ibid.*, 1951, 20, 66. Proc. Ind. Acad. Sci., 1951, 34, 355. (The 'chromatographic behaviours of aminoanthraquinones and their derivatives, direct dyes, basic dyes, acid dyes, and vat dyes, has been studied. The programme includes the study of the light absorption characteristics and the affinity for cellulose of anthraquinonoid vat dyes and their leuco compounds.)

13. N. Ramanathan, Citrinin and its analogues, for M.Sc. (Tech.), begun in 1951 likely to be completed in 1954. (A new total synthesis of citrinin, applicable to its derivatives and analogues, is being developed.)

14. V. Ramanathan, Action of Raney nickel on intermediates and dyes, for Ph.D., begun in 1949 ended in 1953. (The use of Raney nickel for constitutional studies in the dyestuff field is being examined.)

15. G. N. Kao (Jointly with Dr. B. D. Tilak), Desulpurization of certain sulphur containing intermediates and Dyes, for Ph. D., begun in 1949 likely to be completed in 1954, Published in Proc. Ind. Acad. Sci. (The use of Raney nickel for constitutional studies in the dyestuff field is being examined.)

16. R. S. Prayag, Application of polymerised oils to textiles, for M.Sc. (Tech.), begun in 1948, ended in August 1951. (The use of indegenous

oils as binders in Pigment printing of textile materials is studied. It is found that after suitable modification, castor oil and Tung oil give satisfactory prints of good washing fastness. A method for emulsifying modified oils to prepare pigment printing emulsions and their fixation on testiles is worked out.)

17. J. G. Naik, Study of some physical properties of hypochlorites solutions. for M.Sc. (Tech.), begun in 1948 ended in August 1951. (The rate of self-decomposition of commercial and C. P. sodium hypochlorite solutions has been studied. It is shown that the self-decomposition of hypochlorite solutions can be accounted for by the simultaneous formation of sodium chlorate in equivalent amounts. At ordinary temperature hypochlorites do not produce free oxygen during self-decomposition.)

18. C. B. Kothari, Studies in Oxycelluloses, for Ph.D., begun in 1949, Has submitted thesis result awaited. A note is published in J.S.Dc. (The mode of degradation of cellulose on exposure to light in presence of active vat dyes is investigated and it is found that a definite type of oxycellulose is obtained in every case. The mode of oxidation is found to be similar to that when cellulose is oxidised by hypochlorite solutions in presence of free leuco compounds of the same vat dyes.)

19. G. P. Tawde, Some experiments on finishing of textiles, for M.Sc. (Tech.), begun in 1950 ended in April 1952, In course of publication, (" Some experiments on finishing of Textiles."
The important role played by moisture, heat and pressure on the final feel and lustre of a starched fabric is studied in great detail for various calendering operations including Schreiner calendering with soluble starches, their penetration in the fabric is shown to be responsible for determining the final stiffness.)

20. M. D. Bhavsar, The oxidation and Fries migration of Coumarin derivatives, for M.Sc. (Tech.), begun in 1949 ended in April 1951, Published in Curr. Sci., 1950, 19, 312 and 1951, 20, 325. Ind. J. of Pharmacy, 1951, 13, 200. (Coumarin, 6—97-methoxy-4 methyl Coumarins, 5-methoxy-4 : 7-dimethyl Coumarin, 5 : 7-6 : 7-, and 7 : 8-dimethoxy-4-methyl Coumarins and 4′-methyl-1 : 2-naphtha-∝-pyrone were oxidised by alkaline potassium persulphate and demethylated to get poly hydroxy Coumarin. Fries Migration of p-toluene-sulphonates of 6-7-hydroxy-4 methyl Coumarins and 5-hydroxy-4 :7-dimethyl Coumarins was studied.)

21. M. S. Marballi, Studies in a-and-y-resorsilic acid derivatives, for M.Sc. (Tech.), begun in 1948 ended in September 1950, Published in J. Sci. Ind. Research Vol. 11B No. 7, 1952, p. 292, (2 :6 dihydroxy-banzanilide, 2 :6 dihydroxy benz-p-tolyla-rmde, 2 : 6 dihydroxy-p-anisylmide, 2 :6 dihydroxy-∝-dihydroxy-∝-naphthalamide and dehydroxy-β-naphthalamide have been prepared and condensed with ethylacetate with the exception of 2 :6 dihydroxy-Benz-β-naphthelamide, which could be condensed only in the presence of anhydrous $AlCl_3$, the other condensations could be carried out in the presence of 99 per cent. sulphuric acid.)

22. R. M. Desai, Studies in the derivatives of ∝-and-β-naphthols as coupling components, for Ph.D., begun in 1947 ended in August 1950. (A number of hydroxy ketones from ∝- and β-naphthol have been prepared and their usefulness as coupling components have been studied. A quantitative determination of substantivity was also carried out by ultra-violet absorption method.)

23. D. V. Karve, Studies in the Friedel and Crafts reactions, for M. Sc. (Teach.), begun in 1947 ended in September 1950, (Phthalic anhydride was condensed with *(i)* Toluene *(ii)* p-xylene *(iii)* Chlorobenzene, *(iv)* Naphthalene and *(v)* β-methyl-naphthalene. The Aroyl-o-Benzoic acid obtained in each case was then reduced and finally cyclised to get the corresponding anthrone.)

24. G. K. Wagle, Studies in photo degradation of wool, for Ph.D., begun in 1949 ended in July 1952, (result awaited), (The chemical as well as the physical aspects of degradation of wool by both sunlight and the Fadeometer exposures have been exhaustively studied. The study was further extended to the dyed wool.)

25. H. B. Mehta, Chemistry and manufacture of Hydron Blue and allied products, for M.Sc. (Tech.), begun in 1949 ended in October 1950, (Technical preparation of Hydron Blue has been investigated.)

26. V. V. Ghaisas, Synthesis of polycycle compounds, for M.Sc. (Tech.), begun in 1948 likely to be completed in 1954 One paper has been forwarded for publication. (Synthesis of sulphur containing heterocyclic ring systems is under investigation.)

27. G. N. Kao, Desulphurization of certain sulphur containing intermediates and dyes, for M.Sc. (Tech.), Working for Ph.D., begun in 1949 likely to be completed in 1954, One paper published in Proc. Ind. Acad. Sci. (Raney nickel reduction of dye intermediates and dyes is under investigation.)

28. M. R. Paranjape, Antitubarcular and antibacterial agents, for M.Sc. (Tech.), begun in 1950 likely to be completed in 1954. (Synthesis of analogues and derivatives of chloraniphenicol and synthesis of anti-T.B. compounds is under investigation.)

29. K. Rabindran, Synthesis in thiophene, furan and Imdole series, for M.Sc. (Tech.), Working for Ph.D., begun in 1950 ended in 1953, published in Proc. Ind. Acad. Sci. and Curr. Science. (A new and general synthesis of dibenzothiophene has been developed. Several thiophene derivatives have been prepared.)

30. B. Suryanarayana, Intermediates and dyes containing heterocyclic ring systems, for M.Sc. (Tech.), Working for Ph.D., begun in 1950 likely to be completed in 1954. (Synthesis of vat dyes by the condensation of 2:3-dichloro-1:4-naphthoquinone with phenols and acetoacetanylides is under investigation.)

31. M. S. Tawakley, Technical preparation of Indanthrene Blue RSN and Chlorinated Indanthrone, for M.Sc. (Tech.), begun in 1950 ended

in 1952 (Technical preparation of Indanthrene Blue RSN. and Chlorinated indanthrone has been investigated).

32. G. R. Kulkarni, Design and construction of a laboratory unit for jute yarn sizing tests, for M.Sc. (Tech.), begun in 1948 ended in January 1951. (The design and construction of a laboratory sizing unit for Jute yarn have been described. The mechanism of drying of Jute Yarn has been studied and its critical moisture content determined.)

33. S. B. Gadre, Studies in Insecticides,etc., Use of DDT in Malaria control, for M.Sc. (Tech.), begun in 1949 ended in November 1951, A paper published by D. K. Viswanathan and S. B. Gadre in the Indian Journal of Malariology, 4, 487-503, 1950, (A modified colorimetric method of Alessandrim was developed for the estimation of small amounts of DDT in field work. This method was employed in the determination of residual DDT content in spray deposits, and the results were correlated with entemological data.)

34. B. K. Kamath, Recovery of sulphur, etc., from brines and indigenous raw materials, for M.Sc. (Tech.), begun in 1951, M.Sc. (Tech.), work is likely to be completed in June 1953. Indian Patent application for recovery of additional salt from sea-water, made in February 1952 in association with the research teacher. (A simple process has been developed for the recovery of additional salt and Potassium chloride from bitterns. The process will be tried out on a Pilot plant scale very soon. Experiments have been carried out also on a reaction between reduced calcium sulphate and magnesium chloride, for the recovery of hydrogen sulphide. The calcium sulphate is obtained as a by-product of the process for the recovery of additional salt from bitterns.)

35. S.K. Kanthan, Recovery of sulphor from indigenous, raw materials, for M.Sc. (Tech.) begun in 1950. (Work suspended during illness of candidate and later appointment as Demonstrator.)

36. M. H. Domadia, Part I : Liquid-liquid extraction of fatty oils and their derivatives. Part II : Utilization of glycerine foots, for M.Sc. (Tech.), begun in 1946 ended in 1950. (I. Using liquid-liquid extraction method, groundnut oil has been de-acidified using EI-OH of diffconon. Ternary system, EI-OH-F. F. A.—Groundnut oil has been studied. II. Glycerne residues recovered from glycerine foots (waste product from glycerine distillation) were used instead of glycerine in printing pastes.)

37. J. S. Cama, Modification of fatty oils (Modification of Mowrah oil), for M.Sc. (Tech.), begun in 1948 ended in 1950. (Refined mowrah oil was hydrogenated. Products obtained from the hardened material by crystallization from either acetone or hexane were similar to cacao butter or tallow according to conditions of crystallization.)

38. G. K. Belekar, Analytical and separation studies of hydrogenated fats and their crudes, for M.Sc.(Tech.), begun in 1945 ended in May 1952, published in J. Sci. and Ind. Res., 1952, 11B, 140. (Factory samples of unrefined groundnut, sesame, cotton seed and coconut oils and vanaspatis manufactured from them were examined for their constants and

composition. In general vanaspati was characterized by high iso-oleic acid content (20—35 per cent.) and low linoleic acid content (2—5 per cent.)

39. P. T. Bhide, Study of hydrogenated fats, for M.Sc. begun in (Tech.), 1949, ended in August 1952, published in J. Sci and Res., 1952, 11B, 140. (Composition, consistency and keeping quality of vanaspatis produced by a few factories over a period of few weeks have been examined. Critical solution temperatures of ghee, vanaspati and their mixtures have been determined using a mixture of amyl and ethyl alcohols.)

40. G. M. Ranadive, Phase separation studies in the field of fats, for M.Sc. (Tech.), begun in 1948 ended in April 1951, Published in J. Sci. and Ind. Res., 1951, 10B, 62. (Aniline-Fatty oil-white oil, Solvent-fatty acids—White oil. These systems have been studied with a view to apply the information for detecting adulteration.)

41. S. G. Bhat, Utilization of inedible oils, for M.Sc. (Tech.), begun in 1951 ended in June 1953. (Oils of sesame, karanja, neem and lomba have been fractionated by molecular distillation. The various fractions have been analysed and those rich in unsaponified matter have been tested for their antibacterial activities.)

42. C. B. Khanpara, Studies in surface active agents, for M.Sc. (Tech.), begun in 1949 ended in June 1953. (Conditions for the preparation of mixed monoglycerides from various oils and for sulphation of the former have been studied. Detergent properties are being investigated.)

43. K.B. Kulkarni, Preparation of fatty alcohols, for M.Sc. (Tech.), begun in 1951 ended in December 1952. (Optimum conditions for the preparation of fatty alcohols by high pressure hydrogenation of coconut oil have been investigated. 80—90 per cent. conversion has been obtained. Ethyl esters are more easily converted than the glycerides).

44. B. Sreenivasan, Studies in hydrogenation, for M.Sc. (Tech.), begun in 1947 ended in December 1952. (Attempts are being made to separate quantitatively hydroxy from non-hydroxy acids in hydrogenated castor oil as well as in the original oil.)

45. S. S. Kalbag, Studies on the properties of soap solutions—Electrolytic oxidation of soaps, for M.Sc. (Tech.), begun in 1950, (Result awaited), (Soaps dissolved in organic solvent (EtOH or acetone) were oxidized electrolytically and the optimum conditions for the maximum yield of alcohols and olefines were determined.)

46. N. C. Patel, The separation of fatty acids, for M.Sc. (Tech.), begun in 1949. (Based on the very low solubility of stearic acid and high molecular weight saturated fatty acids in dilute EtOH near o °C., a quantitative method has been worked up to estimate saturated acids in a fatty oil.)

47. D. A. Desai, Disinfectants from Indian raw materials, for M.Sc. (Tech.), begun in 1948 ended in November 1950 (Details of preparation of

antiseptics from locally available coal tar products have been worked out.)

48. M.D. Patel, A study of Indian Shiya Zera, for M.Sc. (Tech.), begun in 1949 ended in October 1950. (Chemistry and pharmacognosy of Shiya Zera has been studied).

49. M.A.D. Affonso, Part I : Hydrophilic supository bases. Part II : Studies on Mycobacterium tuberculosis (var. Bovis, B. C. G. Strain), for M.Sc. (Tech.), begun in 1949 ended in April 1951, Published in Part II Ind. J. of Ph., 1950, 42, 56 Ind. J. of Ph. 1952, 14, 23, Ind. J. of Ph., 1952, 13, 269). (Part I : It has been shown that Kokum butter, a native product, can be used advantageously in India for making suppositories which are self-emulsifying. They can be used with or without liquid medicaments. Part II : A new medium for cultivating mycobacterium tuberculosis has been developed.)

50. M. A. D. Affonso, Synthetic Chemotherapentics, for Ph.D., begun in May 1951 ended in 1953, published in Ind. J. of Ph., 1952, 14, 3. (A new technique for testing anti-tubercular compounds has been also developed. SYNTHETIC CHEMOTHERAPEUTICS :—During a study of the antibacterial properties of cinnamic aldehyde derivatives, it was found that α-Bromo-p-nitro cinnamic aldehyde was very active. Its activity compound favourably with the major antibiotin. Further work is in progress.)

51. R. S. Baichwal, Antibacterial properties of β-naphthol derivatives for M.Sc. (Tech.), begun in 1949 ended in March 1952. Published in J.Sc. Ind. Res., 1951, 10A, 498. *Ibid.*, 1952, 11A, 197. *Ibid.*, 1952, 11B, 169. (A number of derivatives of β-naphthol have been prepared and tested for their bactericidal activity against B. typhosus and Staph. aureus. Some promising compounds were further examined for their bacteriostatic and penetration powers. Influence of organic matter on these properties has also been studied.)

52. S. D. Bhirud, Synthetic anti-bacterials of naphthalene series, for M.Sc. (Tech.), begun in June 1951 ended in 1953. (Derivatives of β-naphthol have been studied for antibacterial properties by Mr. Baichwal and Mr. M. L. Khorana. Some of the corresponding derivatives of α napthil have been studied by Miss Jhaveri and Mr. Khorana, the latter work is being continued and some new derivatives are being prepared in order to study the antibacterial properties.)

53. J. G. Devi, Assay of pharmaceuticals, for M.Sc. (Tech.) begun in July 1950 ended in September 1952. (Instrumental methods of analysis for the estimation of flavine dyes have been worked out. A new method of assay for Aspirin, Phenacetin and Caffein has been developed.)

54. L.R. Gunay, A study of anti-septic and anthelmintic uses of pyridine derivatives, for M.Sc. (Tech.), begun in June 1950 ended in 1953. (Many compounds consisting of pyridine nucleus and chemical groups like alkyl, aryl, amino, hydroxy, halogen, nitro carboxyl etc., have been prepared and tested against earthworms and bacteria, *e.g.*, staphy aurensus, bacillus typhdus. Work is still in progress.)

55. G.J. Kapadia, Study of vegetable drugs, cassia fistula, for M.Sc. (Tech.), begun in June 1951 ended in 1953, (Miss Modi and Mr. Khorana have reported. (Ind. J. of Pharm. XIV, 61, 1952) rhim a costituent of Cassia fistula to be possessing antitubercular activity. Consequently efforts are being made to isolate the original glycorides present in cassia fistulla with a view to study their chemotherapeutic properties. Other derivatives of anthraquinones similar to rhim are also being prepared for the same purpose.)

56. K.S. Manudhane, Study of vegetable drugs, for M.Sc.,(Tech.), begun in June 1951 ended in 1953. (Different procedures for developing a more convenient and accurate method for determination of the alkaloidal content of Cinchona bark are being studied.)

57. S. M. Thakore, Studies on the antiseptic and anthelmintic properties of phenoline derivatives, for M.Sc. (Tech.), begun in July 1950 ended in 1953. (A number of Quinoline derivatives are being prepared for their antibacterial and anthelmintic activity with a view to correlate chemical constitution to the above mentioned therapeutic properties.)

58. Miss M. B. Vangikar, Study of antifungal properties of synthetic compounds, for Ph.D., begun in June 1950 ended in 1953. (Work on the development of a suitable method of testing antifungal agents is in progress.

59. V.B. Mainkar, Studies in natural resins: some fundamental properties of lac, for M.Sc. (Tech.), begun in 1948 ended in July 1950, published in Part Anal. Chem. 1950, 724. (The presence of a COOH group in lac has been definitely established and the saponfication of the resin under different conditions has been investigated.)

60. J. M. Nadkarni, Studies in natural resins—oxidation and reduction of lac, M.Sc. (Tech.), begun in 1948 ended in November 1950. (A method for the determination of the carboxyl value of lac has been standardised. Hydrogenation halogenation, oxidation under different conditions has been studied, and it has been shown that lac is unlikely to contain any exhenoid unsaturation.)

61. D.B. Vidwans, Studies in fats and fatty acids, for M.Sc. (Tech.), completed in July 1951. (The chlorination and dehydrochlorination of fats, fatty acids and their methyl esters has been studied, and the products obtained have been examined for their use in surface coatings and as surface active agents.)

62. L.N. Mankad, Studies with carbazole, for M.Sc. (Tech.), begun in 1947 ended in September 1951. (A method for separating carbazole from anthracene and other hydrocarbons has been developed and the use of carbazole modified with drying and nondrying oils in surface coatings has been investigated.)

63. Y. S. Shah, Studies in Vitamin 'C' for M.Sc. (Tech.), begun in 1949 ended in October 1951, published in Curr. Sci., 21, 161, 1952. (Effect of certain environmental and cultural factors have been studied in order to elucidate the mechanism of biosynthesis of ascorbic acid and their possible role on the formation of ascorbic acid oxidase during

germination of seeds. Processing of natural materials rich in vitamin 'c' have been attempted with a view to obtain stable concentrates.)

64. S. S. Gothoskar, Studies on biotin metabolism in micro-organisms, for M.Sc., (Tech.), begun in 1949 ended in August 1951. (Studies include (*i*) mechanism of synthesis of biotin in *E. Coli*, (*ii*) sparing effect of aspartate and oleate on biotin with respect to nucleic acid synthesis in *L. arabinosus* and *L. casei*, (*iii*) Co-enzyme nature of aspartic acid with reference to its de-amination by resting cells of *E. Coli*, and (*iv*) role of biotin in various enzyme systems in *L. arabinosus*.)

65. R. C. Marathe, Studies in proteins and polyses, for M.Sc. (Tech.), begun in 1949 ended in May 1952. (The effect of heat processing of Bengal gram (*i*) on the release of amino acids after acid and enzyme hydrolysis, and (*ii*) on certain lives enzymes in the alabino rat, and he presence of a proteolytic inhibitor in raw meal has been studied.)
The nature of tamarind seed polyose has been ascertained from the studies on. Viscosity and release of sugar during degradation. The properties of polyose of *cassie fistula* have been studied.

66. M. A. Pathak, Fungal amylases, for M.Sc. (Tech.), begun in 1950 ended in January 1952. (Conditions of culture for production of amylases from a strain of *A. oryzae* on wheat bran and *A. Niger* under submerged conditions have been studied with a view to obtain an efficient desizing agent or a pure enzyme preparation on semi-large scale without appreciable loss in activity.)

67. H.R. Alimchandani, Studies in Vitamin B_{12} and folic acid, for M.Sc. (Tech), begun in 1951 ended in 1953. (Inter-relationships between PABA, folic acid and vitamin B_{12} and their effects in overcoming the growth inhibition by sulfa drugs are studied with a view to elucidate their roles in biosynthesis of methionine, parines, pyrimidines, etc. Mechanisms of penicillin action on nucleic acid, metabolism is also studied in relation to folic acid and vitamin B_{12}.)

68. S.B. Dhungat, Studies in folic acid and Vitamin B_{12}, for M.Sc. (Tech.), begun in 1951 ended in 1953, Published in J. Biol. Chem. 1952. (Synthesis of xanthine oxidase *in vitro* by lives slices from protein-depleted, folic acid deficient and aminopterin treated rats has been studied under different conditions. Studies are in progress to investigate the component amino acids in the protein moiety of the enzyme and also to show the effect of folic acid and related compounds on xanthine oxidase and other enzymes.

69. D. V. Rege, Metabolic studies in folic acid and Vitamin B_{12}, for Ph.D., begun in 1949, ended in September 1952, published in Sci. and Cul., 17, 15, 1951 ; Nature, 166, 1117, 1950. (Effects of folic acid, vitamin B_{12} and certain natural supplements have been studied in micro-organisms (*i*) on nucleic acid make-up (*ii*) its breakdown and (*iii*) purine and pyrimidine metabolism. Studies also include the properties of an unidentified factor for *L-casei* isolated from APF, nutritive status of *L. casei* with respect to folic acid and APF and the mode of action of folic acid and B_{12} in overcoming Cal_4 induced liver injury in rats.)

70. D. V. Tamhane, Studies in Toxicity and antibacterial action with special reference to Citrinin, for M.Sc. (Tech.), begun in 1951 ended in 1953. (Work is carried out on (*i*) production of citrinin analogues by use of precursors in culture medium of *A. candidus*, (*ii*) antibacterial, antifungal activities of citrinin derivatives, degradation prospects and derivatives of 4-hexyl resorcinol and (*iii*) mechanism of action of these compounds from study of their effects on bacterial enzyme systems.)

71. R. H. Bengeri, Studies in Oxycellulose, for M.Sc. (Tech.), begun in 1951 ended in June 1953. (Experiments, carried out to elucidate the effect of crystallinity of cellulose on oxygen consumption during accelerated oxidation, have shown that the crystallinity has no appreciable effect on oxygen consumption.
A method of determining carboxylic acid content of cellulose using organic bases is under investigation. The work is in progress.)

72. G. S. Sudrik, Studies in Oxycellulose, for M.Sc. (Tech.), begun in 1951 expected in June 1954. (The oxidation of only the potential aldehydic group, was attempted with different oxidising agents, some of which are giving encouraging results. The properties of these oxycelluloses obtained from hydrocellulose are being studied. The work is in progress.)

73. R.R. Wagle, Degradation of cellulosic materials under atmospheric conditions, for M.Sc. (Tech.), begun in 1951 ended in June 1953. (The effect of varying amounts of residual impurities, (acidic basic and neutral) on the faric, in the presence of light and under exposure, is being investigated. Some of these agents have a protective influence, many have no action and others highly tender the fabric.)

74. G. K. Joshi, Studies in liquid-liquid extraction, for M.Sc. (Tech.), begun in 1951, Likely to be completed by June 1953. (Liquid-liquid extraction of Linseed and Safflower seed oils with solvents like furfural, petroleum ether, ethyl acetate, acetone, etc., is being studied with a view to obtain more drying fractions of the above oils.)

75. N. V. Junnarkar, Technical preparation of Indanthrone Dark Blue BO and other Benzanthrone derivatives, for M.Sc. (Tech.), begun in 1951 ended in June 1953. (Technical preparation of Indanthrone Dark Blue BO is completed. Work on nitro and iso dibenzanthrones is in progress.)

76. M. W. Kirtikar, Utility of Chlorineanhydrous aluminium chloride, for M.Sc. (Tech.), begun in 1950 ended in June 1953. (Technical manufacture of anhydrous aluminium chloride in a specially designed furnace producing about 40 lbs. of $AlCl_3$ is completed.)

77. Rajendra Shankar, Technical preparation of Caledon Jade Green and allied colours, for M.Sc. (Tech.), begun in 1950 ended in July 1952. (Technical preparation of Caledon Jade Green on laboratory scale is completed. Pilot plant work in manufacture of Benzanthrone, 4-4′-diben-zanthronyl, 16-17 dihydroxy dibenzanthrone is also over.Large scale mathylation to produce the final dye is in progress.)

78. N. R. Thakore, Studies in Pyrolysis-Destructive distillation of cocoanut shells, for M.Sc. (Tech.), begun in 1948 ended in April 1951, The work has been sent for publication. (Coconut shells were carbonised in a specially designed apparatus, in situ, instantaneously, in horizontal and vertics retorts at different temperatures ranging from 300—700 °C. The products obtained were analysed and in particular the pyroligneous acid obtained in each experiment was tested form its specific gravity, acid value, sap. value, carboxyl value, and ester number. The steamed charcoal was tested for absorption.)

79. B. S. Kodare, The carbonisation products from wood, for M.Sc. (Tech.), begun in 1948 ended in April 1951, The work has been sent for publication. (About 46 different sample of wood available in the state of Bombay were distilled in a specially designed apparatus. The products obtained on distillation were studied in particular the pyroligneous acid obtained in each case was tested for its specific gravity acid value, sap. value, carboxyl value, and ester number, from about 25 samples of wood was analysed for its chemical constitutens.)

80. H. J. Modi, Electrolytic metal powders—copper powder, for M.Sc. (Tech.), begun in 1950 ended in June 1952, One publication in J.Sc. Ind. Res., 1951, 10B, 48. Two more papers have been sent for publication. (Copper powder has been prepared by electro deposition under different condition of current density, temperature of the bath, acid strength, copper concentrations, etc., and the properties of the powder obtained in each case were studied.)

81. M. N. Marathe, Determination of thermal conductivity of powders, for M.Sc. (Tech.), begun in 1951 ended in 1953. (An apparatus has been designed to study the thermal conductivity of materials in the form of powder. It is proposed to study the effect of particle size on thermal conductivity of powders.)

82. K. S. Sanvordenkar, Studies in metal powders-bearing compositions M.Sc.(Tech.), begun in 1951 ended in 1953. (Iron powder is being made electrolytically and some bearing composition made from Iron-Copper-graphite and Iron-graphite powders are being studied for their anti-friction properties.)

83. J. Y. Somnay, Enrichment of Ores, for M.Sc. (Tech.), begun in 1951 ended in 1953. (Enrichment of some strategic minerals is being done.)

84. R. M. Khandwala, The production of iron powder from Indian Iron Ore and its properties, for M.Sc. (Tech.), begun in 1950 ended in August 1952. (A rotary kiln was designed to study reduction of the Indian hematite ore. The variables which have been studied are feed rate, slope of the kiln, mass velocity of hydrogen used for reduction, temperature, etc.)

Chemistry

1. V. K. Atre, Constitution of shellac dyes, for Ph.D., begun in 1950. (The homogeneity of laccaic acid, as at present known, is being examined, and the constitution of the pure colouring matter is being investigated.)

2. N. V. Bringi, Constitution of morellia, for Ph.D., begun in 1949 ended in 1953. (The constitution of the anti-bacterial colouring matters present in Garcinia Morella is under investigation.)

3. R. Mani, Chemotherapy of filariasis, for Ph.D., begun in 1951. (Sulphur and nitrogen containing heterocyclic compounds which are likely to have antifilarial activity are being synthesized.)

4. J. H. Amin, Studies in Cashewnut shell liquid resins. Part 1: Fries reaction of the aryl esters of sulfonic and carboxylic acids. Part 2: The preparation of quinolinic acid and its derivatives, for M.Sc., begun in 1948 ended in October 1950. (Fries Migration of phenyl, O-m-p-cresyl, α and β naphthyl-p-toluene sulfonates; Resorcinol, and Hydroquinone di-p-toluene sulfonates; Methyl salicylate, Salol, Shirlan of prenyl p-acetanilide p-toluene sulfonates as well as Acetyl of Benzoyl salicylic acid of similar compds. was studied. Oxidation of quinoline with $KNMO_4$ was attempted to get quinolinic acid.)

5. V. A. Kamath, Studies in emulsions. A critical study of the role of interfacial tension in the stabilization of emulsions, for Ph.D., begun in 1949 ended in March 1952. (The interfacial tensions of a number of derivatives of aniline were determined by the drop size method using a micro-meter syringe with an accuracy of 1/5000 cc. About 200 emulsions were prepared using different soaps. The effect of I. T. on their stability is discussed).

6. A. V. Sunthankar, Synthesis of hydrocyclic compounds, for M.Sc., begun in 1949 ended in April 1951, Published in the Proceedings of the Academic of Sciences, Bangalore. (Several new derivatives of thionaphthene were prepared by the cyclization of thiophenoxy acetaldehyde dimethyl acetal.)

7. A. V. Sunthankar, Synthesis of compounds related to chloromycetin, for Ph.D., begun in 1951 likely to be completed in 1954. (Synthesis of sulphide, sulphoxide and sulphone analogue of chloramphenicol is under investigation.)

8. S. R. Desai, Absorption spectra of thiophenes, for M.Sc., begun in 1950. (Absorption spectra of thiophene derivatives have been studied.)

9. V. V. Kholgade, Studies in fatty oils, for M.Sc., begun in 1947 ended in June 1952. (The fatty acid composition of the oils of CALOPHYLLUM INOPHYLLUM and SHOREA ROBUSTA have been determined. The former does not contain any resin acids as reported by previous investigators, but contains a hydroxy acid closely related to tannins.)

10. Miss F. K. Modi, A study of vegetable purgatives containing anthraquinone derivatives, for M.Sc., begun in 1947, ended in April 1951, Published in Ind. J. of Pharmacy 1952,14, 61. (Chemistry of important Chemical constituents of Cassia fistula have been studied. Besides other constituents, rhein has been isolated and found to be active against Mycobacterium Tuberculosis).

11. V. D. Dalal, Studies in Ephedra alkaloids, for M.Sc., begun in 1948

ended in September 1951, Published in Ind. J. of Pharmacy, 1950, 12, 165 and 1950, 12, 173. (A new method of attraction of ephedra has been developed. Newer methods of assaying ephedra have also been studied and methods of converting pseudo-ephedrine into ephedrine worked out.)

12. Mrs. L. G. Kulkarni, Studies in natural resins-fractionation of lac and lac acids, for M.Sc., begun in 1948 ended in February 1951. (A direct liquid, liquid fractionation of lac in alcoholic solution has been developed and the properties of the various fractions examined. Controlled saponification of lac gives an acid, with a free carboxyl group which has been characterised as its hydrozone.)

13. R. A. Kulkarni, Studies on Vitamin C, for Ph.D., (result awaited), begun in 1949 ended in May 1952. (Studies include (*i*) stability of Vitamin 'C' and in aqueous solutions, (*ii*) differentiation between enzymic andcupriction oxidation of the vitamin and (*iii*) nature of ascorbic acid oxidase in relation to related enzymes, polyphenolase and peroxidase.)

14. Miss S. T. Devlalkar, Biochemical aspects of drug resistance, for Ph.D., begun in 1950 ended in 1953, (Studies relate to (*i*) Acetylation of sulfanilamide by susceptible and drug resistant strain of *E. coli.* under different cultural conditions (*ii*) effect of supplements on formation of arylamine in culture filtrate of drug resistant strains and (*iii*) determinations of dehydrogenase activity of susceptible and resistant strains of *E. Coli.*)

15. Miss U. T. Marfatia, Effect of folic acid and vitamin B_{12} on protein metabolism, for M.Sc. begun in 1950 ended in October 1952, Published in Nature, 1951, 167, 1067, Curr. Sci., 1951, 20, 123, Nature, 1952, 169, 1096, (Work has been carried out on (*i*) influence of folic acid and vitamin B_{12} on creatine metabolism in mice, (*ii*) transmethylation re-actions in rat livers in relation to folic acid and B_{12} and (*iii*) influence of vitamins B_{12} on biological value of a low quality protein diet.)

16. V. B. Mithandar, Studies in folic acid, for M.Sc., begun in 1950 ended in 1953, Published in Curr. Sci., 1951, 20, 129, (Studies relate to the synthesis of folic acid like compounds by certain micro-oranisms and tissues and its identification as citrovorum factor (C. F.). The enzymic liberation of folic acid and C. F. from natural materials and its role in different enzyme systems have been investigated.)

17. Miss S. B. Bharani, Studies in nicotinic acid. Biogenesis and Metabolism, begun in 1950, Published in Curr. Sci., 1952, 21, 161. (Effect of different environmental conditions and cultural factors on nicotinic acid content of germinating legumes have been studied in relation to ascorbic acid synthesis. The role of phosphorylation of carbohydrate intermediates has been studied from phosphatase and pyrophosphatase activities and use of selective posphorylation inhibitors. The function of nicotinic acid as co-enzyme in the synthesis of ascorbic acid is under study.)

Cipla Laboratories,

Chemistry

1. S. Mahdihassan (Teacher), Chinese origin of alchemy, published by Bombay University J., Kimia is a Chinese word meaning "Gold-making-Plantjuice."

2. V. M. Bakshi, (under Dr. Mahdihassan as teacer), (*a*) Serpentina alkoloids, begun in 1950 completed 1950 published in Ind. Jour. of Pharmacy Vol. XII, 1950, A method is described to standardize alkoloids,) (*b*) Lecithin from Liver Waste, begun in 1951 completed in 1951 Published in Ind. Jour. of Pharmacy Vol. XII, 1951, (Utilization of Liver waste from Liver extracs for Lecithin is described,) (*c*) Studies on Sterols, for M.Sc., begun in 1952 to be completed in 1954. (Work under progress.)

3. V. G. Pradhan (under Dr. K. A. Hamied teacher,) Microbiological Standardization of liver extract, for M.Sc., begun in 1949 ended in 1951, published in Indian Journal of Pharmacy September 1952. (Assay of Potency of liver extracts using Mycobacteriun Carotinogen.)

4. T. de Lima (under with Dr. Mahdihassen as Teacher), (*a*) Lecithin from Liver Waste, completed in 1951, published in Indian J. of Pharmacy 1951. (Utilisation of bye-pr of Liver Extract for Lecithin manufacture (*b*) Metabolic Fate of Invert sugar Part I, completed in 1950 published in Ind. Jl. of Medical Research Vol. XXXIX, 1951 (Absorption, Excret the effect of Insulinsugar utilisation.) (*c*) Metabolic Fate of Invert sugar Part II, completed in 1951 published in Ind. Jl of Medical Research Vol. XXXIX 1951 (Glycogen formation in L and Muscle. (*d*) Studies on Carbohydrate Metabolism, for MSc., begun in 1950 to be completed in 1954. (Work in progress.)

Microbiology

S. Mahdihassan (Teacher), Symbolysis in the genus Coriococcus, published in Zeit. f. aug., Entomologie Germany 1951, Vol. 33, p. 108. (The colour of the insect is due to a bacterium.)

Sir Currimbhoy Ebrahim Memorial Dental College and Hospital,

Dentistry

1. Dr. K. L. Shourie, M.Sc., MBBS., M.D.S., Ph.D., Vice-Principal, Incidence of Dental diseases amongst School Children, begun in 1951, Likely to be completed within next six months.

2. Dr. K. L. Shourie, M.Sc., MBBS., MDS., Ph.D., Vice-Principal, Fluorine content of drinking water in Bombay, begun in 1951, Likely to be completed within next six months.

3. Dr. N.C. Datta, M.Sc., Lecturer in Biochemistry, Fluorine content of drinking water in Bombay, begun in 1951, Likely to be completed within next six months.

4. Dr. K. L. Shourie, M.Sc., MBBS., MDS., Ph.D., Vice-Principal, Bacteremia after extraction, begun in 1951-52, Likely to be completed within next six months.

5. Dr. H. P. Moolgavkar, MBBS., FDS., RCS. (Eng.), Prof. of Dentistry, Bacteremia after extraction, begun in 1951-52, Likely to be completed within next six months.

6. Dr. (Mrs.) S. D. Soman, MBBS., DTM & H, Lecturer in Bacteriology, Bacteremia after extraction, begun in 1951-52, Likely to be completed within next six months.

7. Dr. L. G. Shirwatkar, B.D.S. Research Fellow, Bacteremia after extraction, begun in 1951-52, Likely to be completed within next six months.

8. Dr. K. L. Shourie, M.Sc., MBBS., MDS., Ph.D., Vice-Principal, Facial Growth amongst school children, begun in 1951-52, Likely to be completed within next six months.

9. Dr. G. Coelho, MRCP., Prof. of Children diseases & Senior Hon. Pediatrician, Facial Growth amongst school childrem, begun in 1951-52, Likely to be completed within next six months.

10. Dr. (Miss) K. N. Jai, B.D.S., Research Fellow, Facial Growth amongst school children, begun in 1951-52, Likely to be completed within next six months.

11. Dr. A. M. Mallowalla (formerly Dr. A. M. Khandadia Lecturer in Dentistry, B.Sc., LDS., CPS., B.D.S., 1. Effect of different concentrations of NaF on growth of Actimomyces, Published in *Journal of All India Dental Association.* 2. Histopathology of Dental Caries. A.I.D.A.

12. Dr. K. Chand, B.D.S., D.D.S., MS (USA), Hon. Lecturer in Dentistry & Dental Surgeon. (Vital Pulpotomy for young and permanent teeth. A. I. D. A.)

13. Dr. S. S. Khera, B.D.S., Preliminary Investigation on the effect of Attritution on the Research of Pulp. November 1951. A.I.D.A.

14. Dr. V. Subramanian, B.Sc., M.D.S., Junior Lecturer in Dentistry, Causes for extraction of teeth amongst hospital patients—December 1951. A.I.D.A.

15. Dr. (Miss), K.N. Jai, B.D.S., Research Fellow. Incidence of dental diseases amongst Gujarati children in Bombay City. A. I. D. A.

D. & H. National College & W. A. Science College, Bandra.

Bio-Chemistry

1, R. V. Bhagwat, M.Sc., Studies on the Precurser of Nicotinic acid, for Ph.D., degree, begun in October 1951 ended in June 1953, Attempts are made to isolate the bound form of Nicotinic acid known as its precursor from Ground nuts. It has been isolated in an impure form and its further purification is in progress.

Chemistry

1. Miss M. P. Gidwani, Influence of various Glycrophosphates on physical properties of gelatin, for M.Sc., begun in January 1952 Likly to be completed in January 1954, Ashless gelatin has been prepared by electrodialysis of 1 per cent solution, concentrating under vacuum and drying in vacuum desicator Hydration of the ashless gelatin has been studied by Heyman's dilatomieter in presence of solutions of various concentrations of sodium glycrophosphate and compared with that in presence of NaH_2PO_4.

University School of Economics & Sociology

Sociology

1. Athaide, R. V., The Extent of Rational Thought in Educated India, for Ph.D., Research Completed, begun in July 1942 ended in April 1951, (T-2—1134 of 10th April 1951).

2. Cabinetmaker (Miss) P.H., Social Services in India, with special reference to the City of Bombay, for Ph.D., begun in June 1944 ended in July 1950, (T-2-1439 of 3rd July 1950.)

3. Desai (Mrs.), N.A., Impact of the British Rule on the position of Indian Woman, for M.A., begun in July 1947 ended in June 1951, (T-2-3003 of 27th June 1951.)

4. Kadri, S. K., A Socio-Economic Survey of Lower Stratum of Employees, for M.A., begun in July 1947 ended in June 1951, (T-2-1892 of 13th June 1951.)

5. Mehta (Miss), U. H., Social and Political Thought of Mahatma Gandhi, for Ph.D., begun in June 1946 ended in October 1951, (T-2-5085 of 18th October 1951.)

6. Modi, (Miss), M. S. H., Worli in Evolution ; a study in City Development, for Ph.D., begun in June, 1943 ended in October 1950, (T-2-2787 of 27th October 1950.)

7. Pooviah (Miss), S., The Art and Science of Classical Dancing and its Social Bearings, for Ph.D., begun in December 1941 ended in July 1950, (T-2-1438 of 3rd July 1950.)

8. Rege, B. S., Hindu Marriage, for Ph.D., begun in July, 1947 ended in January, 1952, (T-2-17 of 2nd January 1952.)

9. Agarwala B.R. Marwari Community of Bombay, Ph.D., November 1951 likely to be completed in November 1954.

10. Mistry (Miss), D. K., The Child in Society, for Ph.D., begun in July 1950 likely to be completed in June, 1953.

11. Mistry (Miss), J. P., Family as a Unit of Society, for Ph.D., begun in June 1951 likely to be completed in June, 1954.

12. Patil, P. L., Nature of Serious Crimen in Bombay, for Ph.D., begun in November 1951 likely to be completed in November, 1954.

13. Panchandikar, K. C., Causation in Human Society, for Ph.D., begun in June 1951 likely to be completed in June, 1954.

14. Ranadive, J. S., Some volunteer Organisations, for Ph.D., begun in June 1947 likely to be completed in June, 1953.

15. Rao, M. S. A., Changing Pattern of Culture (Malayalam Region), for Ph.D., begun in June, 1950 ended in September, 1952.

16. Sahiar (Miss), G. H., Social Change with Particular Reference to the Parsi Community, for Ph.D., begun in July, 1951 likely to be completed in June, 1954.

17. Sharma, M. L., Social Organisation in a Refugee Population, for Ph.D., begun in November, 1951 likely to be completed in November, 1954.

18. Venkatarayappa, K. N., Social Ecology of Provincial Towns, for Ph.D., begun in September, 1950 ended in September, 1952.

19. Gaekwad, B. B., Socioloical Study of Village Panchayats in Thana District, for M.A., begun in July 1950 likely to be completed in June, 1953.

20. Kurup, C. P. D., Evolution of Soviet Society, for M.A., begun in June, 1950 likely to be completed in June, 1953.

21. Patankar, N. R., Constitution and Growth of Social Classes through Ages, for M.A., begun in July, 1950 likely to be completed in June, 1953.

22. Patil, C. S., The Socio-Economic Survey of the Middle Class in Bombay, for M.A., begun in July, 1950 likely to be completed in June, 1953.

23. Shah, M. V., Social Philosophy of Gandihji, for M.A., begun in July, 1949 likely to be completed in June, 1953.

Economics

1. Barmeda, J. N., Agricultural Tenancy in Gujarat, for Ph.D., begun in July 1942 ended in December 1950, (T2-3214 of 6th December 1950).

2. Bhouraskar, K. M., Municipal Finance in certain Leading Indian States, for Ph.D., begun in June 1946 ended in February 1951, (T-2-502 of 15th February 1951.)

3. Cirvante, V. R., Indian Capital Market, for Ph.D, begun in June 1946 ended in August 1951, (T-2-4336 of 24th August 1951.)

4. Contractor, J. P., Insurance and the State, for Ph.D., begun in July 1944 ended in January 1952, (T-2-88 of 10th January 1952.)

5. Desai, T. M., The Finance of Bombay Government, 1935-36 to 1950-51, for Ph.D., begun in July 1946 ended in September 1950, (T-2-2334 of 20th September 1950.)

6. Donde, W. B., Rural Labour in the Konkan, for Ph.D., begun in June 1946 ended in June 1951, (T-2-2061 of 25th June 1951.)

7. Duggal, D.S., Industrial Punjab; a study in Partition problems, for Ph.D., begun in July 1948 ended in November 1950, (T-2889 of 13th November 1950.)

8. Gouri, G. S., The Impact of Urbanization on Rural Economy, for Ph.D., begun in June 1948 ended in March 1952, (T-2-842 of 19th March 1952.)

9. Honavar, R. M.,A Critical Review of the Theory of Employment, for Ph.D., begun in June 1945 ended in July 1950, (T-2-1440) of 3rd July 1950.)

10. Kamat, R. G., The Problem of Indian Shipping, for Ph.D., begun in July 1939 ended in February 1951, (T-2-616 of 23rd February 1951.)

11. Kanungo, K., Land Problems in Orissa, for (M.Sc.Agri.), begun in July, 1949 ended in February, 1952, (T-2-413 of 14th January 1952.)

12. Mavinkurve, B. S., Agricultural Labour in Bombay Karnatak, for Ph.D., begun in July, 1943 ended in April 1952, (T-2-9857 of 4th April 1952.)

13. Nadkarni, M. S., Banking Legislation in India, for M.A., begun in July, 1934 ended in May 1952, (T-2-1395 of 13th May 1952.)

14. Naik, K.N., Cooperative Movement in Bombay, for Ph.D., begun in June 1946 ended in April 1951, (T-2-1132 of 9th April 1951.)

15. Nehalchand (Miss), S., Economic Case for Socialism in India, for Ph.D., begun in July, 1947 ended in July, 1950, (T-2-1443 of 3rd July 1950.)

16. Pardiwala, J. J., Exchange Banks in India, for Ph.D., begun in July, 1940 ended in November, 1950, (T-2-3028 of 23rd November 1950.)

17. Pendse, B. P., Large-scale Industries of Maharashtra, for M.A., begun in June, 1945 ended in June, 1950, (T-2-1213 of 12th June 1950.)

18. Remedios, H.M., Cottage Industries in India and their role in Industrial Economy, for M.A., begun in July, 1945 ended in June, 1950, (T-2-1389 of 28th June 1950.)

19. Shah, C.H., Effects of War on Agriculture in India, with special reference to Gujarat, for Ph.D., begun in June, 1946 ended in April 1952, (T-2-1005 of 5th April 1952.)

20. Sundaram, J. D., The Problem of Foreign Capital, for Ph.D., begun in June, 1948 ended in November, 1951, (T-2-5429 of 21st November 1951.)

21. Zachariah, K. A., Industrial Relations, for Ph.D., begun in June, 1947 ended in March, 1951, (T-2-803 of 10th March 1951.)

22. Acharya, I. G., Economics of Minimum Wage with special reference to India, for Ph.D., Under preparation, begun in June, 1949 ended in June, 1952.

23. Borker, V. V., Public Finance and Full Employment (with special reference to backward economics), for Ph.D., begun in July, 1950 likely to be completed in June, 1953.

24. Brahmananda, P.R., Economics of Welfare maximisation with special reference to pricing in Public Utilities, for Ph.D, begun in June, 1946 likely to be completed in June, 1953.

25. Desai, B. C., Industrial Development of India since 1939, for Ph.D., begun in July, 1950 likely to be completed in June, 1953.

26. Desai, J. K., Economics of Animal Husbandry with special reference to Gujarat, for Ph.D., begun in July, 1950 likely to be completed in June, 1953.

27. Duraiswamy Nadar, V.S.K., Income-tax in India, with special reference to problems of administration, for Ph.D., begun in January, 1951 likely to be completed in June, 1954.

28. Gadgil V. S., Protection in Theory and Practice, for Ph.D., begun in July, 1951 likely to be completed in June, 1954.

29. Gunishastri, P.V., The Effects of Tariffs on the Industrial Development of India, for Ph.D., begun in November, 1950 likely to be completed in June, 1953.

30. Khatkhate, D. R., Monetary Policy and the Development of Underdeveloped Areas with special reference to India, for Ph.D., begun in June, 1949 ended in July, 1952.

31. Krishna, K.G.V., Economic Co-operation within the ECAFE Region, for Ph.D., begun in June 1949 likely to be completed in June, 1953.

32. Mehta, S. D., The Indian Cotton Textile Industry ; An Economic Analysis, for Ph.D., begun in June, 1950 ended in June, 1952.

33. Nayak, R. G., Recent Trends in Central Banking Policy, for Ph.D., begun in July, 1950 ended in June, 1952.

34. Nayampalli, (Miss), K.S., Economic History of India for Ph.D., begun in July, 1950 likely to be completed in June, 1953.

35. Panandikar (Miss), S. S., Organisation and Management of Joint-stock Companies, for Ph.D., begun in July, 1950 ended in June, 1952.

36. Pandya, G. M., The present position and future prospects of Chemical Industries in India, for Ph.D., begun in July, 1946 ended in August 1952.

37. Paranjape, H. K., Public Enterprise in India, for Ph.D., begun in August, 1949 likely to be completed in June, 1953.

38. Pattanshetti, C. C., Role of Banking in India's Industrial Development, for Ph.D., begun in July 1950 likely to be completed in June 1953.

39. Paymaster, K. R., State Control of Industries in India, for Ph.D., begun in July 1947 likely to be completed in June 1953.

40. Peter, P. C., Industrial Development of Travancore-Cochin State, for Ph.D., begun in June, 1950 ended in June, 1952.

41. Rao, K. S., Measurement of the Structural Changes in an Economy with special reference to India (1919—1947), for Ph.D., begun in June, 1949 ended in September, 1952.

42. Shah, K. D., Problems of Land Ownership, for Ph.D., begun in July, 1951 likely to be completed in June, 1954.

43. Shah, S. M., Rural Class Stucture in India with special reference to Gujarat, for Ph.D., begun in June, 1949 ended in November, 1952.

44. Shivmaggi, H.B., Recent Agrarian Reforms in Bombay (with special reference to their socio-economic effects), for Ph,D., begun in July, 1951 likely to be completed in June, 1954.

45. Thakore, (Miss), K. H., Labour Management Co-partnership in Industry, for Ph.D., begun in December 1951 likely to be completed in January, 1955.

46. Adsule, P. L., Agricultural Labour in the Indore District (Madhya Bharat), for M.A., begun in July, 1950 ended in November 1952.

47. Bhuvanchandran, V., Cooperative Central Financing Agencies in Bombay, for M.A., begun in July, 1950 ended in November, 1952.

48. Krishnaswamy, J., Foreign Investments in India, for M.A., begun in July, 1950 likely to be completed in June, 1953.

49. Sanghavi, P. S., Land Rights and Agricultural Production, for M.A., begun in November, 1950 likely to be completed in June, 1953.

50. Sastri, V. K., Elasticities of Demand in India's Foreign Trade, for M.A., begun in November, 1951 likely to be completed in November, 1954.

51. Subramanyam, T. V., On Cement Industry, for M.A., begun in November, 1950 likely to be completed in June, 1953.

52. Talpallikar (Miss), M. B., Some Aspects of Welfare Economics, for M.A., begun in July, 1948 likely to be completed in June, 1953.

53. Muranjan, S. W., Economics of Garden Crop in Thanns District, M.Sc. (Agri.), begun in June, 1951 likely to be completed in June, 1954.

Politics

1. Batliwala (Miss), C. J., India and Parliamentary Democracy, for Ph.D. begun in August 1948 ended in November 1951, (T-2-5562 of 27th November 1951.)

2. Krishnan, N.K., The End of the State in Ancient Indian Political thought, for Ph.D., begun in July, 1949 ended in September 1951, (T-2-4869 of 29th September 1951.)

3. Nair, V. S., Nature of the Ancient Indian State, for Ph.D., begun in June, 1949 ended in September 1951, (T-2-4646 of 17th September 1951.)

4. Thottappa, K. B. Y., Trends in Modern Federalism, for Ph.D., begun in July, 1949 ended in August, 1951, (T-2-4183 of 13th August, 1951.)

5. Badhe, G. S., Social Legislation, for Ph.D., begun in July, 1949 likely to be completed in June, 1953.

6. Bhojani (Miss), H. N., Political Education of Modern India, for Ph.D., begun in June, 1951 likely to be completed in June, 1954.

7. Divetia (Mrs.), K. V., Inter-relations of Governments in India in the 20th century, for Ph.D., begun in July, 1950 likely to be completed in June 1953.

8. Gopal, P. V., Ideological Conflicts in Indian Political Life, for Ph.D., begun in June, 1949 likely to be completed in June, 1953.

9. Murdeshwar, A. K., Administrative Problems Relating to Nationalisation, for Ph.D., begun in June, 1949 likely to be completed in June, 1953.

10. Samant, S. V., Village Self-Government in Bombay State, for Ph.D., begun in June 1950 likely to be completed in June, 1953.

11. Apte, B. K., Experiment of Democracy in the Eastern Countries, for M.A., begun in December, 1951 likely to be completed in December, 1954.

12. Budhraja, R. N., Socialist Movement in India, for M.A., begun in October, 1949 ended in November 1952.

13. Mahadevan (Miss), S., The Liberal Movement in India, for M.A., begun in November, 1949 ended in June, 1952.

Elphinstone College

Sanskrit

Dr. N. J. Shende, M.A., Ph.D., Lecturer in Sanskrit, The Religion and Philosophy of the

(*i*) Atharvaveda (completed) begun in 1949 ended in 1952, Published by the Bhandarkar Oriental Research Institute, Poona-4. (Original contribution to the Vedic Religion and Philosophy Treats all aspects of the Religion of the Atharvaveda such as, medicine, erotics, State craft, Sacrifice, domestic, and religious minerals and the meaning of the term Brahman, contribution of the AV to the Upanisadic thought and the Atharvanic Upanisads.)

(*ii*) The Religion of the Yajur-Veda (undertaken ; not completed), begun in 1952 likely to be completed in 1955.

(*iii*) The Foundations of the Atharwanic Religion. (Completed), begun in 1948 ended in 1951. Published in the Bulletin of the Deccan College Research Institute Vol. IX Pp. 1—216, Poona-6. (This work treats the mythology of the Atharvaveda for the 1st time, and attempts to explain the basis of the Religion of the AV.)

Gujarati

1. Prof. K.B. Vyas, M.A., Kahnadade Prabandha (An old Gujarati saga of 15th century) (being published). This is the most outstanding Old Gujarati work. I have collected the text from over 12 MSS, begun in 1941 ended in December, 1952. The work is being published in the Rajasthan Government series. It will be out by December, 1952. (This is an outstanding old Gujarati work. If deals with the history and social conditions of Gujarat and Rajasthan in the 14th-15th century. The work is of great importance linguistically.)

2. S. A. Upadhyaya, M.A., " Religions Reforms in India during the last 150 years, Submitted and accepted for the award of N. M. Parmanand Prize of the Bombay University completed in 1951 will be shortly published as an independent Publication. (This is the only study of its kind in Gujarati.)

Haffkine Institute

Bacteriology

1. Miss Khorshed M. Pavri, Fecal flora of infants and children with special reference to diarrheas, for Ph.D., begun in December 1950 ended in 1952, Published in Indian J. Child Health August 1952. (Intestinal flora of Indian infants and children upto 2 years of age, in health and in diarrhea has been studied in detail.)

2. Mrs. Shanta S. Rao Action of crystaline enzymes on bacterial antigens and antibodies, for Ph.D., begun in April 1950 ended in April 1953. A part of the work is under publication and will appear

in Indian J. Medical Res. January 1953. (Crystalline enzymes are known to posses specific properties. The aim of the study is to find out what action these crystalline enzymes have on antigens and antibodies.)

3. Dr. D. W. Soman, Rickettsial diseases of man—Laboratory aspect of diagnosis, for Ph.D., begun in March 1950 likely to be completed in October 1953, Some papers pubished in Ind. Med. Gaz. (The work chiefly refers to three rickettsial diseases in India, namely, endemic typhus, scrub typhus and Q fever. This investigation would necessarily contribute to reducing the number of cases of undiagnosed pyrexias and also throw light on the varied epidemiology of these diseased.)

Organic Chemistry (Chemotherapy)

1. R. A. Bellare Synthesis of Sulphones of possible therapeutic activity, for M.Sc., begun in 1944 ended in 1950, published in Proc. Ind. Acd. Sc.A. 34 : 17—19, 34 : 183—186 of 1951. (Synthesis of unsymmetrical sulphones.)

2. M.H. Shah, Chemotherapy of Malaria, for M.Sc., begun in 1945 ended in 1950, Published in Proc. Ind. Acad. Sc. A. 34: 54—60, 34: 178—182 of 1951. (2-Chlorolepidines, 4-Chloroquinaldines and 4-phenoxy-quinolines are prepared. A few 4-amminoquinolines are also prepared and found that the amino group is inert. The reactivity of position 4 and 2 have been studied. Some 4-amino-anilinoquinolines, quinolylthiazolamines and quinolylpyrimidylamines, have also been prepared.)

3. B. N. Palande, Synthesis of Pterins with possible therapeutic activity, for M.Sc., begun in 1946, ended in November 1951, pubished in Proc. Ind. Acad. Sc.A. (in press), (Synthesis of N1-aryl-2-thio-4-oxy-6,7 disubstituted and N1-aryl-2, 4-dioxy-6, 7 disustituted pterins as possible folic acid antagonists. Also substituted thiopyrimidines and pyrimidines were prepared.)

4. V.M. Patki, Chemotherapy of Intestinal Infections, for M.Sc., begun in 1946 and ended in October 1952, In preparation, (A number of N-4-acyl substituted derivatives of potent sulphonamide drugs have been prepared and the absorption and excretion characteristics of sulphadiazine and 14 other derivatives thereof have been studied.)

5. B. S. Kulkarani, Chemotherapy of Malaria (Synthesis of—Biguanides for M. Sc., begun in 1946 ended in December, 1951. published in Proc. Ind. Acad. Sc. A. In press, (A$_3$ number of p-aminophenylthioureas substituted at the N position with aryl or alkyl radicals have been prepared. These have been converted into phenylenedithioureas by reacting with different isothiocyanates. 5-methyl derivatives of these have also been prepared. Some quanyl-thioureas and their S-methyl derivatives have also been synthesised. Finally a number of p-phenylene biguanides have been synthesised.)

6. S. S. Sabnis, Chemotherapy Tuberculosis. (Synthesis of—para-aminosalicylic acid and derivatives thereof), for M.Sc., begun in 1949 and ended in November 1952. In Progress. (Synthesis of p-aminosalicylic acid and derivatives thereof (*i*) Synthesis of p-nitro-salicylic acid from phenylacetic acid. (*ii*) Synthesis of PNS from 2, 4-dinitro chlorobenzene. (*iii*) Synthesis of PNS from 2-amino-4-nitrotoluene, *via* 2-alkoxy-4-nitrobenzoic acid. (*iv*) Synthesis of PNS from 2-amino-4-nitro to luene via. 2-amino-4-nitrobenzoic acid (*v*) Reduction of PNS and PAS. (*vi*) Derivatives of PNS and PAS.

7. K. D. Kulkarni, Studies in the Chemistry of Thiazoles, for Ph.D., begun in 1946 likely to be completed in June 1953, In Progress. (Studies in the Chemistry of thiazoles and related compounds.)

8. D. G. Bapat, Chemotherapy of Bacterial Infections, for M.Sc., begun in 1949 completed in June 1953, In Progress. (Synthesis of N_1-Benzimidazolylsulphonamides and N_1-Benzoxozolylsulphonamides.)

9. N. J. Sardesai, Chemotherapy of Bacterial Infections, for M.Sc., begun in 1949 completed in June 1953, In Progress. (Synthesis of N, N-substituted sulphonamides ; and Schiff's bases of sulphonamides and nuclear hydroxy-substituted sulphonamides.)

10. M. Y. Mhasalkar, Synthesis of compounds of possible therapeutic value, for M.Sc., begun in 1950 likely to be completed in June 1954, In Progress. (Studies in chemistry of pyrimidines and related compounds.)

11. S. V. Nabar, Chemotherapy of Malaria, Synthesis of Quinolyl biguanides, for Ph.D., begun in 1946 and likely to be completed in December 1953, In Progress, (Synthesis of 4 (p isopropyl guanidinoanilino) quinolines.)

Biochemistry (Nutrition)

1. R. B. M. Colah Studies in the microbiological Assay of Vitamins with special Reference to members of B-group, for Ph.D., begun in 1946 ended in 1953, Work in progress. (The vitamin requirements of six locally isolated strains of lactobacilli have been studied. A microbiological method for riboflavin assay has been developed using one of the strains to limiting amounts of two vitamins at a time have been studied.)

2. Miss N. K. Kohla, The effect of Vitamin A and Essential Fatty Acids on the Production of Cutaneous Lesions in Rats, for M.Sc., begun in January 1949 ended in March 1952, Thesis—M.Sc., degree awarded, Papers to be published. (Animal experiments tend to show that deficiencies of vitamin A in conjunction with essential fatty acids play an important role in the production of cutaneous lesions in rats resembling those in 'pheynoderma.' Lack of vitamin A plays a larger role in the production of such lesions.)

3. Miss Tara R. Kundaji Research Scholar, Studies on Blood and

Tissue Proteins, for M.Sc., begun in September 1949 ended in March 1952, A thesis is submitted to the University of Bombay. (*Part I.*—An evaluation of specific gravity methods for determination of blood proteins in the assessment of state of nutrition in population groups. *Part IIa.*—Nutritional evaluation of some plant proteins by growth, N-balance and blood and tissue protein regeneration methods.)

(*b*) Supplementary nutritive value of some subsidiary cereals.

Biochemistry

1. P. D. Deshpande, Studies on the Biochemistry and Nutritive Value of Amaranth (Amaranthus—gangeticus), for M.Sc., begun in October 1946 ended in January 1951, Thesis—M.Sc. degree awarded, Papers to be published. (A complete investigation of a leafy vegetable, amaranth, has been carried out. This icludes the Nitrogen Complex, the carbohydrate Complex, the Phosphorus Complex and the Vitamins. The estimations of essential amino acids as well as the Biological value and the digestibilty coefficient, when supplemented at a 5 per cent. level with Rice diet were also studied.)

2. J. P. Aroskar, Studies on Niacin Tryptophane Inter-relationships, for M.Sc., begun in July 1947 ended in January 1951, Thesis—M.Sc. degree awarded Papers to be Published. (Experiments were carried out on rats, to study the influence of supplements of maize, tryptophane, niacin and some tryptophane—deficient proteins on growth and tissue niacin contend ; and of sulfa drugs on the excretion of niacin.)

3. L. S. Krishnan, (*i*) Dietic Hepatic Lesions—A Study of the Biochemical and Histological Aspects, for M.Sc., begun in November 1944 ended in October 1951, Thesis M.Sc., degree awarded, Papers to be Published. (Dietary hepatic cirrhosis can be produced by (1) fatty infiltration leading to hepatic fibrosis and cirrhosis, (2) by massive hepatic necrosis. These two important aspects of the problem were studied experimentally with reference to the biochemical and histological changes in the liver.)

(*ii*) Dietetic Hepatic Lesions and Protein Deficiency, begun in November 1944 ended in April 1949, Published in Current Science, Apr. 1949, Vol. 18, p. 108. (The effect of vitamin B2 Complex deficient diet containing different levels of protein on the liver and the effect of restricted intake of protein in an otherwise adequate diet on the histological and biochemical changes in the liver of rats are described.)

(*iii*) Effect of Choline and Methionine on the Experimentally produced hepatic lesions in rats, begun in June 1947 ended in December 1949, Published in Current Science, Jan. 1950, Vol. 19, p. 14. (The effect of the lipotropic agents choline and methionine, at varying levels, when supplemented to a high fat-low-protein diet are described.

4. M. E. Kulkarni, Biochemical studies in snake venoms, for M.Sc., begun in 1952 likely to be completed in 1954. (Study of Neutralization

of venom and Antivenim determination of the number of Antigenus in the different venoms.)

5. Y. V. More, Lipoproteins in Horse sera, for M.Sc., begun in 1952 likely to be completed in 1954. (Separation of lipoids and lipoproteins from Horse sera and from pseudoglobulin fraction.)

Biochemistry and Immuno-chemistry

1. Dr. S. S. Rao, (*i*) Purification of Antitoxins from immune Horse sera, begun in 1951 ended in 1953. Work consist in isolating the immune v. globulins from Horse sera.

(*ii*) Biochemical studies in Indian snake venoms, begun in 1952 likely to be completed in 1956. (Fractionation of venoms, using Agar diffusion technique and Electrophocesis.)

Microbiology

1. Miss R.S. Vakil, Studies in production of Dextram, for M.Sc., begun in 1952 likely to be completed in 1954. (Preparation of Dextram from Leuconotic Dexranicum and from the enzyme dextrasucrare.)

Dr. Gajjar's Pathological Laboratory

Biochemistry

1. S. M. Nadkarni, B.Sc., (Technician) & Miss R. S. Broker, M.Sc., "Suitability of the Indian Male-tode *Bufo Melanostictus* in Dictating Chorionic Gonadtropin." Begun in July 1949 ended in July 1950. Published in Indian Journal of Medical Sciences: 5: 228, 1951 (*Bufo melanosticuts* was found to be useful for diagnosing pregnancy whereas *Rana tigrina* showed seasonal variation. Acetone precipitate of the hormone from the patient's urine was used for injection in the dorsallymph sac. Spermatozoa in the cloacal contents were found if test was positive.)

Grant Medical College, Pathology Department

Human Parasitology

1. Dr. B. K. Gadgil, M.D., Lecturer in Pathology and Dr. S. N. Shah, M.D., Human Urinary Schistosomiasis focus in India, begun in March 1952, To be completed. Under Publication. (An endemic focus of this disease has been located and described authentically for first time from India in GIMBVI in Guhaghar taluka in Ratnagiri District of Bombay State. Epidemiology is discussed.)

Protozoology

1. Dr. S.N.Shah, M.D., under Dr. B. B. Yodh, M.R.C.P., D.T.M.S., Giardiasis begun in April 1952 completed. (Incidence, in population, seasoned variation and relation to dietry have been studied.)

Dental Bacteriology

1. R. K. Shirwatkar, B.D.S., under Dr. K. L. Shoarie, Ph.D., M. D. S., M.B.B.S., Bacteriaemia in Dental sepsis and extractions, begun in April 1951, completed. (Bacterial flora of septic lesions of teeth were studied. Incidence of bacteriaemia specially after extractions was studied.)

Clinical Pathology

1. S. N. Rathod, MBBS., under Dr. B.B. Yodh, MRCP., DTMS., Liver functions in Chronic diarrhoeas, begun in April 1949 completed. (Several Liver function tests were studied in selected studied cases of chronic diarrhoeas and damaged function was noted.)

Virology

1. Dr. P. V. Gharpure, M.D., DTM. & H., Polio-epidemiology cum virus, study, begun in April 1949 To be completed. (Strains of viruses isolated are being studied. Epidemiological studies are being carried out.)

Anatomy

1. P. S. Dastur, M.S., Professor of Anatomy, Grant Medical College, Bombay, Work on Ossific Centres in Embroys and Featuses, begun in 1950, Depends on getting the material.

2. B. B. Sethna, M. S., Lecturer in Anatomy, Grant Medical College, Bombay, Work on Ossific Centres in Embroys and Featuses, begun in 1950, Depends on getting the material.

Indian Dairy Research Institute, Bangalore

Cattle Husbandry

1. M.C. Rangaswamy, I.D.D.N.D.D. (Scot.), Dairy Husbandry Officer (Head of Dairy Husbandry Section), Herd development—Body weight in relation to young calves—Dam progeny relation in body weights—Study of variation in Fats and S. N. F. of milk. As a routine measure of academic interest, Routine problem of long duration. (The work on the two breeds of Indian cattle, *i.e.*, Sindhis and Girs and Murrah buffaloes is being conducted.)

2. A. J. Lazarus, I. D. D., Superintendent, Herd development—Body weight in relation to young calves—Dam progeny relation in body weights—Study of variation in Fats and S. N. F. of milk. As a routine measure of academic interest, Routine problem of long duration. (The work on the two breeds of Indian cattle, *i.e.*, Sindhis and Girs and Murrah buffaloes is being conducted.)

3. Dr. C. P. Anantakrishnan, Ph.D., Assistant Dairy Chemist, A study of the gestation period in cows, begun in 1950-51, published in 1951

in Ind. Jour. of Dairy Sc. (This is a statistical study on gestation of the Sindhi, Gir and Crossbreed cattle of this Institute.)

4. A. J. Lazarus, I. D. D., Superintendent, A study of the gestation period in cows, begun in 1950-51, Published in 1951 in Ind. Jour. of Dairy Sc., (This is a statistical study on gestation of the Sindhi, Gir and Crossbreed cattle of this Institute.)

Animal Nutrition

1. Dr. N.N. Dastur, Ph.D., Second Dairy Chemist, Effect of feeding Iodinated casein for growing calves, heifers and milch cattle. begun in 1949 ended in 1951, Under compilation. (Work on indigenous breeds like Sindhis and Gir were carried out to study the effect on growth rate and milk secretion.)

2. G. K. Murthy, B.Sc., Research Assistant, Effect of feeding Iodinated casein for growing calves, heifers and milch cattle, begun in 1949 ended in 1951, Under compilaton. (Work on indigenous breeds like Sindhis and Gir were carried out to study the effect on growth rate and milk secretion.)

3. D. Narayan, I D. D., Assistant Dairy Husbandry Officer, Effect of feeding Iodinated casein for growing calves, heifers and milch cattle, begun in 1949 ended in 1951 Under compilation. (Work on indigenous breeds like Sindhis and Girs were carried out to study the effect on growth rate and milk secretion.)

4. Dr. S. C. Ray, Ph.D., Dairy Technologist, Effect of feeding cotton-seed and its cake on the yield and quality of milk and milk fat and Nitrogen, Calcium and Phosphorus balances, for Ph.D., of Agra University, begun in 1951. (This is a study on Indian cows and buffaloes to assess the effect of such feeding.)

5. Dr. C.P. Anantakrishnan Assistant Dairy Chemist, Ph.D., Effect of feeding cotton-seed and its cake on the yield and quality of milk and milk fat and Nitrogen, Calcium and Phosphorus balances, for Ph.D., of Agra University, begun in 1951. (This is a study on Indian cows and buffaloes to assess the effect of such feeding.)

6. Gurudev Prasad, M.Sc., Hony. Research Worker, Effect of feeding cottonseed and its cake on the yield and quality of milk and milk fat and Nitrogen, Calcium and Phosphorus balances, for Ph.D., of Agra University, begun in 1951. (This is a study on Indian cows and buffaloes to assess the effect of such feeding.)

7. C. S. Dharmarajan, M.Sc., Research Assistant, Effect of feeding cottonseed and its cake on the yield and quality of milk and milk fat and Nitrogen, Calcium and Phosphorus balances, for Ph.D., of Agra University, begun in 1951. (This is a study on Indian cows and buffaloes to assess the effect of such feeding.)

8. D. Narayan, I.D.D., Assistant Dairy Husbandry Officer, Effect of feeding cotton-seed and its cake on the yield and quality of milk and milk fat and Nitrogen, Calcium and Phosphorus balances, for Ph.D., of Agra

University, begun in 1951. (This is a study on Indian cows and buffaloes to assess the effect of such feeding.)

9. Dr. S. C. Ray, Ph.D., Dairy Technologist. A new system of feeding milch cattle on green fodders to economise the requirements of concentrate feed and the cost of milk production, begun in 1951. (This study envisages economic feeding of dairy cattle by replacing concentrates by green feeds.)

10. D. Narayan, I.D.D., Assistant Dairy Husbandry Officer, A new system of feeding milch cattle on green fodders to economise the requirement of concentrate feed and the cost of milk production, begun in 1951. (This study envisages economic feeding of dairy cattle by replacing concentrates by green feeds.)

11. Dr. S. C. Ray, Ph.D., Dairy Technologist, Effect of feeding high, medium and low fat concentrates on milk and butter fat production in cows and buffaloes at the same level of energy intake, for Ph.D. of Agra University, begun in 1952. (This study is intended to be carried on Indian cows and buffaloes to study the effect of various levels of fat on concentrates in the amount of fat secretion.)

12. Gurudev Prasad, M.Sc., Hony. Res. Worker, Effect of feeding high, medium and low fat concentrates on milk and butter fat production in cows and buffaloes at the same level of energy intake, for Ph.D., of Agra University, begun in 1952 (This study is intended to be carried on Indian cows and buffaloes to study the effect of various levels of fat on concentrates in the amount of fat secretion.)

13. D. Narayan, I.D.D.,Assistant Dairy Husbandry Officer, Effect of feeding high, medium and low fat concentrates on milk and butter fat production in cows and buffaloes at the same level of energy intake, for Ph.D., of Agra University, begun in 1952. (This study is intended to be carried on Indian cows and buffaloes to study the effect of various levels of fat on concentrates in the amount of fat secretion.)

14. M.C. Rangaswamy, I.D.D., N.D.D., Dairy Husbandry Officer, Effect of feeding high, medium and low fat concentrates on milk and butter fat production in cows and buffaloes at the same level of energy intake, for Ph.D., of Agra University, begun in 1952. (This study is intended to be carried on Indian cows and buffaloes to study the effect of various levels of fat on concentrates in the amount of fat secretion.)

15. Dr. C. P. Anantakrishnan, Ph.D., Assistant Dairy Chemist, Factors influencing vitamin 'A' in Dairy Products, for M.Sc., begun in 1951 and ended in 1953. (The effect of feeding shark liver oil concentrate on the vitamin 'A' potency of the milk of cows and buffaloes and the storage life of ghee with reference to vitamin 'A.')

16. K.M.N. Nambudripad, B.Sc., Hony. Research Worker, Factors influencing vitamin 'A' in Dairy Products, for M.Sc., begun in 1951 and ended in 1953. (The effect of feeding shark liver oil concentrate on the vitamin 'A' potency of the milk of cows and buffaloes and the storage life of ghee with reference to vitamin 'A.')

Fodder Husbandry

1. M. C. Rangaswamy, I.D.D., N.D.D., Dairy Husbandry Officer, Comparative yield, habit of growth and composition of indigenous and cultivated grasses at different stages of growth and under different manurial and cultural treatment, begun in 1951. (This work touches the fodder production as is practices in the Institute under different conditions of growth.)

2. S. Vijaya Rao, L. Ag., Technical Assistant, Comparative yield, habit of growth and composition of indigenous and cultivated grasses at different stages of growth and under different manurial and cutlural treatment, begun in 1951. (This work touches the fodder production as is practices in the Institute under different conditions of growth.)

Calf Nutrition

1. Dr. T. N. Paul, Ph.D., Assistant Dairy Technologist, Feeding colostral fat to calves, begun in 1951, published in 192, Ind. Jour. of Dairy Sc., (This aims at the use of fat obtained from the colostrum which is now being wasted as a substitute for milk fat.)

Faculties Science and Technology

1. Dr. K. P. Basu, Ph.D., (Munich), D.Sc., (Dacca), F. N. I., Dairy Chemist, Recognised teacher for M.Sc., and Ph.D., degree of Bombay University. Guiding research on all problems mentioned below against individual workers, Guiding for M.Sc., & Ph.D., degrees.

Bio-Chemistry

1. Dr. A. Kannan, M.Sc., Ph.D., Studies on Enzymes in milk and milk products, for Ph.D., begun in 1947 completed in 1951, published in Series of papers in Ind. J. Dairy Science. (Thorough and systematic study of phosphatase, amylase, protease, catalase, in milk of different species, butter and cheese.)

2. D. Venkatappaiah, M.Sc., Non-protein nitrogen of milk, for M.Sc., begun in 1949, completed in 1951, Part published in Ind. J. Dairy Science. (Effect of species, breed, season stage of lactation, level of protein feeding on the different Non-protein Nitrogen constituents has been investigated.)

3. Miss G. Lily, M.Sc., Minor constitutents of milk, for M.Sc., begun in 1949, completed in 1951.Part published in Ind. J. Dairy Science, (Cholesterol content of milk of different species and breeds and its variation as well as the Phosphorus partition in milk has been studied).

4. Miss K. R. Lalitha, M.Sc., Keeping quality of butter and ghee, for M.Sc., begun in 1948, completed in 1951. (Effect of different treatment of butter and of different procedures for making ghee on the keeping quality of ghee has been studied. The nature of the colour in buffalo ghee prepared by *Desi* method has also been investigated.)

5. M. Bhimasena Rao, B.Sc., (*i*) pH of milk (in collaboration with Dr. Noshir N. Dastur). for M.Sc., begun in 1951. (The role of choline in preventing the incidence of liver cirrhosis is being investigated. The work is being supported by Raptakos Medical Research Board).

(*ii*) Infantile liver Cirrhosis.

6. K. S. Ramachandran, B.Sc., Pyridoxine, biotin and folic acid in milk, for M.Sc., begun in 1951. (The variation in the content of those factors of vitamin B complex is being investigated.)

7. B. S. Baliga, B.Sc., Phospholipoids in milk, for M.Sc., begun in 1952, (Methods for the estimation of lecithin, caphalin and sphingomyelin in milk have been standardised. Their variation and their effect on the flavour of milk and milk products are being studied.)

8. B. N. Premchand, B.Sc., (in collaboraton with Dr. Noshir N. Dastur), Effect of iodinated casein on the milk yield, for M.Sc., begun in 1952, (Work is being carried out on the effect of administration of iodinated casein of the milk yield of both cows and buffaloes.)

9. S. C. Balasubramanian, M.Sc., G.S. Mani, and Miss. Lily, Nutritive value of Indian Dairy Products, begun in 1950. (Chemical composition and nutritive value of milk, curds, khoa, channa and kheer have been investigated. Financed by the Indian Council of Medical Research.)

10. M. N. Krishnaswamy, B.Sc., I. D. D., Standardizing certain method for analysis of ghee, begun in 1950. (The same sample of ghee was analysed at different laboratories and the results were compared. Financed by the Indian Council of Agricultural Research.)

11. Arun Sen Gupta, M.Sc., (*i*) Protein in Cow and buffalo milk, begun in 1948. (Difference in the chemical make up and nutritive value of proteins of cow and buffalo milk is being investigated.)

(*ii*) Nutritive Value of vanaspati, begun in 1947 and ended in 1950. (The relative nutritive value of oil, vanaspati and ghee has been studied.)

12. R. Venkataeswara Rao, M.Sc., Shri M. K. Shastri, B. A., I. D. D., Shri K. S. Gunnery, B. Sc., Shri S. R. Jayashankar B.Sc. To test the important standard methods for analysis of milk and milk products other than ghee, begun in 1950. completed in 1952, (The different methods of analysis of milk and milk products have been standardized. Work was financed by the Indian Council of Agricultural Research.)

13. Sukumar De, M.Sc., I. D. D. Studies on the desiccation and coagulation of milk in the manufacture and storage of indigenous milk products, for M.Sc., begun in 1947, completed in 1951, Part published in Ind. J. Dairy Science. (Systematic study on the standardisation of the technique of manufacture of *khoa* and *channa* with special reference to the quality of the raw material, conditions of desiccation or coagulation (type of the coagulant, and of coagulant in the case of *channa*) with a view to arriving at a quality product suitable as base for Indian

sweets. Incidentally the keeping quality of the products under variable conditions of packing and storage has also been recorded.)

14. K. S. Gunnery, B.Sc. (Hons.), Studies on the biochemistry of processing and storage of milk for long distance collection and transport under Indian conditions, for M.Sc. begun in 1947 completed in December 1951. (Systematic studies on (*i*) the bacteriological and biochemical quality of raw milk, (*ii*) effect of different temperature/time combinations of heat-treatment, (*iii*) pilot plant studies on the effect of different methods of processing, (*iv*) actual field investigations in a built-up milk-collecting-cum-processing unit.)

15. M. R. Srinivasan, M.A., A.I.I.Sc., Studies on the bio-chemical changes in processed milk during its storage under atmospheric conditions., begun in 1952, In progress. (Systematic study of the nitrogen partition of processed milk at different intervals of its storage with special reference to milk deposit formation during reheating of such processed milk.).

16. Sukumar De, M.Sc., Studies on the manufacture and storage of desiccated milk powder, begun in 1952, In progress. (Systematic study on the utilisation of separated milk in the form of a non-reconstitutable powder obtained by open pan desiccation and drying to be worked out on a cottage industry basis.

17. P. Suryanarayana Rao, B.Sc., Studies on the factors influencing the market quality of ghee, for M.Sc., begun in 1952, In progress. (Systematic study on the effect of the feed of the animal, method of manufacture, packing and storage on the market quality of ghee.)

Chemistry

1. R. Venkateswara Rao, M.Sc., Thiamine, riboflavin and nicotinic acid in milk, for M.Sc., begun in 1949, completed in 1951, Part published in Ind. J. Dairy Science. (Effect of species, breed, lactation, feed and souring on the content of these vitamins has been studied.

2. G. S. Mani, M.Sc., Studies on some technological aspects of ghee manufacture from cream, for M.Sc., begun in 1949, completed in March 1952. (Systematic study on the standardisation of the technique of manufacture of ghee by direct heating of cream.)

3. K. C. Nair, B.Sc., Studies on the technological aspects of manufacture, packing and storage of ghee, for M.Sc., begun in 1949, In progress. (Systematic studies on the effect of method of storage and clarification of butter on the initial market quality and storage property of ghee under differing conditions of package.)

4. S. N. Prahlad, B.Sc., Studies on technological aspects of processing and preservation of dairy byproducts, for M.Sc., begun in 1952, In progress. (Possibilities of commercial exploitation of the 'hitherto' wasted dairy byproduct ' ghee reside ' in the form of a supplementary food including a study of (*i*) composition of the raw material, (*ii*) pre-treatment for removal of excessive fat, (*iii*) hydrolysis and conversation into an edible paste or powder.)

5. M. C. Badami, M.Sc., Studies on the utilisation of dairy byproducts, for M.Sc., begun in 1949. completed in March 1952. (Systematic studies on the standardisation of the method of isolation of (*i*) industrial casein of low-fat content from *desi* buttermilk (*ii*) crudelactose from cheese and *channa* whey.)

Agriculture

1. N. B. Shroff, B.Sc., (in collaboration with Dr. C. P. Anantakrishnan), Vitamin A in milk and milk products, for M.Sc., begun in 1952. (Effect of feed and other factors on the vitamin A content of milk is being investigated.)

2. M. S. Pherwani, B.Ag., A.I. D.I., Studies on the technological aspects of ghee manufacture, for M.Sc., begun in 1949, In progress. (Studies on the methods of clarification of butter into ghee with special reference to the yield, initial market quality, etc. Pilot plant studies on a modified technique of clarification and field trials on a semi-large scale plant.)

3. S. Nagarajan, Efficiency of utilisation of feeds for milk production by cows and buffaloes, for M.Sc., begun in 1948, completed in December 1950.

4. R. K. Sen, Raising calves on limited whole milk, for M.Sc., begun in 1949, In progress.

Microbiology and Bio-Chemistry

1. H. Laxminarayana, M.Sc., (*i*) Taxonomy of Lactic Acid Bacteria, for Ph.D., begun in 1948 ended in 1952. (Isolation and characterisation of lactic acid bacteria occurring in milk, dahi, butter and cheese and their identification. Detailed studies on their nutritional requirements.)

(*ii*) Studies on the reducing activities of Lactic acid bacteria, for Ph.D., (Studies on the dye reducing capacities of lactic acid bacteria in relation to factors like oxidation—reduction potential, pH, composition of medium, etc., Mechanism of dye reduction.)

(*iii*) Tetrazolium reduction as a tool micro-biological work, begun in 1951 ended in 1952. Published in *Current Science* 1952, 21, 124. (Use of Tetrazolium reduction for studying bacterial growth and metabolism, bacterial nutrition and enzyme activities.)

(*iv*) Tetrazolium reduction test for quality control of market milk, begun in 1951 ended in 1952. (Application of Tetrazolium reduction test for determining the bacteriological quality of market milk.)

2. S. N. Anantharamaiah, B.Sc., (*i*) Studies on the production of diacetyl by lactic acid bacteria, for M.Sc., begun in 1950 ended in 1952. (Selection of high diacetyl producing organisms and standardisation of conditions for maximum production of diacetyl by *S. faecalis*-209 (Heterofermentative.)

(*ii*) Studies on the desiccation of starter cultures, begun in 1951 ended in 1952.

Bacteriology of Milk

1. Verala Verma, M.Sc. (I. D. D.), (*i*) Studies on spore-forming bacteria in milk, for M. Sc. begun in 1950 ended in 1952, Published in *Indian J. Dairy Sci.* 1950, 3, 137, 1951, 4, 151. (Studies on the incidence, distribution and identification of spore-forming acrobes in milk and their biochemical activities in milk.)

(*ii*) Bacteriological quality of market milk, for M.Sc., begun in 1949 ended in 1951. (Bacteriological quality of market milk produced and handled under different conditions at Bangalore and Lucknow.)

(*iii*) Studics on dairy detergents and sanitizers, begun in 1951, In progress. (Evaluation and standardisation of efficient dairy detergents-cum-sanitizers for use under Indian conditions).

2. V. K. N. Nambudripad, M.Sc., Technical Assistant, (*i*) Bactericidal efficiency of hydrogen peroxide, for M.Sc., begun in 1950 ended in 1952, Published in *Indian J. Dairy Sci.*, 1951, 4, 38, 1952, 5, 135. (Bactericidal efficiency of H_2O_2 in respect of important dairy micro-organisms.)

(*ii*) Use of hydrogen peroxide for preservation of milk, for M.Sc., begun in 1950 ended in 1952, Published in *Indian J. Dairy Sci.*, 1951, 4, 38, 1952, 5, 135. (Peroxide treatment of milk combined with heat-processing to preserve milk from spoilage for long distance transport).

(*iii*) Studies on the synthesis of vitamins and amino acids by lactic acid bacteria, begun in 1950 in progress. (The synthesis of some B-complex vitamins by lactic acid bacteria are being studied with a view to their selection for use in starter cultures).

Micro Biology of Milk

1. V. Lakshminarasimh, B.Sc., Technical Assistant, Studies in micrococci in milk, for M.Sc., begun in 1950 in progress. (Studies on the incidence distribution, characterisation and identification of micrococci in milk. Their biochemical activities in milk, and pigment production.)

2, V. Sreenivasamurthy, M.Sc., (*i*) Microbiological assay of Riboflavin in milk and milk products, for M.Sc., begun in 1950 ended in 1952, Published in *Indian J. Dairy Sci.*, 1952, 5, 53. (Standardisation of the method of Riboflavin assay by the VAP of *L. plantarum*-89 and determination of Riboflavin content in milk and milk products.)

(*ii*) Vitamin B_{12} activity of milk, begun in 1950, In progress, Published in *Indian J. Dairy Sci.*, 1950, 3, 179. (Microbiological assay of vitamin B_{12} in milk.)

(*iii*) Use of paper chromatography in studying bacterial metabolism, begun in 1951, In progress. (Estimation of amino acids, fatty acids, sugars and products of bacterial metabolism by papyrography.)

3. A. Gonsalves, B.Sc., Honorary Research Worker, Amino acid requirements of lactic acid bacteria, for M.Sc. begun in 1952, In progress. (Studies of the nutritional requirements of lactic acid bacteria with special reference to amino acids.)

4. M. K. Krishna Iyengar, B.Sc., I. D. D. Honorary Research Worker, Factors affecting the resistance of micro-organisms to unfavourable conditions, for M.Sc., begun in 1952, In progress. (Studies on the influence of various factors such as physiological age of cells, temperature, pH, etc. on the resistance of organisms to unfavourable environmental conditions).

5. U. C. Srinivasan B.Sc., Biochemical studies on organisms associated with mastitis, for M.Sc., begun in 1952, In progress (Isolation, characterisation and biochemical activities of some organisms associated with bovine mastitis.)

Microbiology of Milk Products

1. R. A Srinivasan, B.Sc., Mycology of desi and creamery butters, for M.Sc., begun in 1951, In progress. (A study of the incidence and distribution of yeasts and moulds in butter manufactured under different conditions.

Veterinary Bacteriology

1. T. Narayan, B.V.Sc., G.M.V.C., Honorary Research worker, Studies on bovine mastitis, begun in 1951, In progress. (Incidence of mastitis in dairy cows and buffaloes, and the use of antibiotics and other therapeutic agents for controlling the infections).

The Indian Institute of Education

Education

1. D. K. Kulkarni, Teacher, Secondary Education in India and Abroad (A comparative study), for Ph.D., begun in July, 1949 ended in 1953.

2. K.R. Dengle, Pleader, Educational Finance in the Province of Bombay (1800 to 1949), for Ph.D., begun in August, 1949 ended in 1952.

3. B. M. Save, Teacher, Training of Teachers, Primary and Secondary in India, for Ph.D., begun in October, 1949 ended in 1953.

4. S. A. Rauf, Professor, Education of Muslims in India, for Ph.D., begun in June, 1950 ended in 1953.

5. N. R. Paransis, Professor, An Educational Survey of Thana District (Bombay), for Ph.D., begun in January, 1951 likely to be completed in 1954.

6. G. S. Dhar, Professor, Finance and Administration of Secondary Education, for Ph.D., begun in November, 1950 ended in 1953.

7. K. S. Vakil, Professor, Basic Vocabulary of Gujarati Children at the age of 11, for Ph.D., begun in February, 1951 ended in 1953.

8. V. R. Gokhale, Professor, Factorial Analysis of Geometrical Tests, for Ph.D., begun in July 1951 likely to be completed in 1954.

9. B. K. Sohoni, Teacher, Problem of Vocational Guidance with reference for Ph.D., begun in January 1950, Completed in October 1952.

10. S. N. Naik, Supervising Officer, Bombay Social Education Committee. Adult Reading Habits and Interests, for Ph.D., begun in July, 1951 likely to be completed in 1954.

11. N. G. Joshi, Teacher, Education of workers and their children in the Industrial area of the city of Bombay, for Ph.D., begun in July, 1951 ended in 1953.

12. N. N. Shukla, Professor, Standardization of tests of Physical abilities and study of heights and weights of boys, Bombay State, for Ph.D., begun in November 1949 ended in 1953.

13. K. G. Desai, Professor, Standardisation of Group-Tests of Intelligence in Gujarati, for Ph.D., begun in July, 1951 ended in 1953.

14. R. N. Jog, Teacher, Transfer of Training, for Ph.D., begun in August, 1951 ended in 1953.

15. K. R. Mehta, Teacher, Language Development of Gujarati children upto the age of 12, for Ph.D., begun in August, 1951 ended in 1953.

16. Mrs. K. D. Pavri, Teacher, The Gifted Child, for Ph.D., begun in August, 1951 likely to be completed in 1954.

17. G. R. Sontakke, Teacher, Psychological Sense of Colour, for Ph.D., begun in November, 1951 ended in 1953.

18. Miss F. Thakurdas, Teacher, Federal Aid to Education, for Ph.D., begun in September, 1949 ended in 1953.

19. S. V. Kelkar, Teacher, Education of the Backward Classes, for Ph.D., begun in May, 1951 likely to be completed in 1954.

20. Miss Nalini Navalkar, Teacher, The Development of National Education in India, for Ph.D., begun in October, 1949 ended in 1953.

21. D. G. Wakaskar, Government Officer, Physical Education Board, Bombay, Physical Education in India, for Ph.D., begun in May 1951 likely to be completed in 1954.

22. V. B. Sule, Government Education Inspecting Officer, Bombay, Leisure time Activities of the workers in the City of Bombay, for Ph.D., begun in May, 1951 likely to be completed in 1954.

23. M. Y. Bhide, Teacher, Education of the Poor students, for Ph.D. begun in May, 1951 likely to be completed in 1954.

24. S. Natarajan Supervising Officer, Bombay Municipality, The Problem of Attendance in Primary Schools, for Ph.D., begun in May, 1951 likely to be completed in 1954.

25. Miss A. R. Italia, Teacher, The Organisation and the Use of Public Libraries in the city of Bombay, for Ph.D., begun in May, 1951 likely to be completed in 1954.

26. W. D. Kulkarni, Teacher, Training of Primary teachers in India, for Ph.D., begun in July, 1951 likely to be completed in 1955.

27. Smt. Beena B. Gokhale, Teacher, Buddhist Education in India and Abroad, for Ph.D., begun in 1949, completed in 1951-52.

28. Smt. Madhuri R. Shah, Registrar, Indian Institute of Education, Bombay, Problem of Educational Administration in India, for Ph.D., begun in 1949 completed in 1951-52.

29. D. M. Desai, Teacher, Universal, Compulsory, Free and Secular Education, for Ph.D., begun in 1949 completed in 1951-52. Under publication.

30. Smt. K. K. Dengle, Teacher, Children's Books in Marathi for M.Ed., begun in April 1949 ended in 1953.

31. A. J. Joshi, Teacher, Group Tests of Intelligence for Gujarati Children, for M.Ed., begun in April 1949, ended in 1953.

32. Smt. K. A. Dandekar, Supervising Officer, Bombay Social Edn. Committee, The Reading interests and aptitudes of the adults, for M.Ed., begun in November, 1951 likely to be completed in 1954.

33. Smt. M. G. Apte, Teacher, Growth of National Education in India, for M.Ed., begun in July 1949 ended in 1953.

34. E. L. D'Souza, Teacher, Religion in Modern Education in India and Abroad, for M.Ed., begun in June 1949 ended in 1953.

35. Smt. S. S. Hemmady, Government Inspecting Officer, Bombay, Theory of Sex Differences, for M.Ed., begun in March 1949 ended in 1953.

36. S. A. Tahir, Assistant Edl. Inspector, W. D. Bombay, Education in India, (1937—1947), for M.Ed. begun in February, 1949 ended in 1953.

37. A. H. Mulla, Teacher, Difficulties of Secondary teachers in the State of Bombay, for M.Ed., begun in March, 1950 ended in 1953.

38. L. V. Joshirao, Teacher, Night High Schools with reference to the City of Bombay, for M.Ed., begun in February, 1950 likely to be completed in 1954.

39. J. B. Tannu, Supervising Officer, Bombay Social Edn. Committee, Wastage in Primary Schools, for M.Ed., begun in July, 1949 ended in 1953.

40. Smt. Keenda Thakur, Teacher, The Radio as an Edn. Medium in India (with reference to Bombay Province), for M.Ed., begun in April, 1949 ended in 1953.

41. G. C. Wagh, Teacher, Critical Survey of the teaching of Geography in State of Bombay with special reference to text books, for M.Ed., begun in September, 1949 ended in 1953.

42. Kumari Aloo Desai, Teacher, Curriculum of Secondary Schools with reference to the Province of Bombay, for M.Ed., begun in July, 1949 ended in 1953.

43. Kumari A. N. Gandhi, Teacher, Psychology of the Mentally handcapped children, for M.Ed., begun in July, 1949 likely to be completed in 1954.

44. Kumari Abraham Ruth, Reading Interests of Girls in Secondary Schools, for M.Ed., begun in 1949 ended in 1953.

45. Kumari Seeta Samant (Now Smt. Sudha Kanolkar), The Education in the city of Bombay, for M.Ed., begun in August, 1949 ended in 1953.

46. Smt. Padma Kirtikar, History of Education of Women in India (1800—1947), for M.Ed., begun in February, 1949, completed in 1951-52.

Ismail Yusuf College, Jogeshwari

Persian

1. M. I. Kazi, Assistant Lecturer in Persian, Life and works of Faizi, for Ph.D., begun in 1950, Likely to be completed in 1953.

Khalsa College

Marathi

1. Mrs. S. Karandikar, Marathi versions of the Ramayana, begun in 1950 ended in 1953. (Comparison of the Marathi Rama-Lit with original Ramayana—the changes—the origin of the changes—the attitude of Marathi poets.)

2. Dr. G. B. Gramopadhye, (1) Critical edition of Eknath's, Rukmini Swaayanwar, for Ph.D., begun in 1951 ended in 1953. (Critical edition texts to be fixed by the application of textial criticism.)

(2) Survey of Bakhar Lit. in Marathi, begun in 1952 ended in 1953, (Bakhars in Marathi are chronicles and therefore looked upon as History. But they can be looked upon as independent form of Lit. which was the product of particular age.

Sanskrit

1. Prof. Sane, P. S., ' Mimansa rules in practice,' for Ph.D., begun in 1952 likely to be completed in 1954. (How Mimansa rules are

made use of by writers on Dharma Shastra to reconcile complicting texts.)

2. Prof. K. P. Jog, Hymns to As'vins in the Rigveda, for Ph.D., begun in 1952, likely to be completed in 1954. (A critical translation and survey of their contents.)

3. Dr. Manilal Patel, Ph.D., (1) Annotated Translation of the Rigveda, for Ph.D., begun in 1937 likely to be completed in 1955, (1) Complete translation of the Rigveda in the light of the latest researches and full notes the previous researches done by both western and eastern.

(2) Bhagawadgita, for Ph.D., begun in 1950 ended in 1952. ((2) Deals with the form and the Philosophy of the Bhagawadgita studied from the view point of comparative religion and thought.)

Philosophy

1. Prof. Angelo Moses, Leibritzian Pholosophy, for Ph.D., begun in 1942 ended in 1953. (Extracts have been published in the Philosophical Quarterly. (A brief exposition of the Philosophy of Leibritz with particular reference to the Monadology.)

English

1. Mrs. D. Patwardhan, Life and work of Mrs. Steel, for Ph.D., begun in 1952 likely to be completed in 1954. (A review of the ninetees in Anglo-Indian literature. A critical estimate of the works of Mrs. F. Steel, author of 30 novels, short stories and miscellaneous work on Anglo-Indian Life.)

Gujarati

1. Prof. Upadhyaya, Evaluation of style in Gujarati Literature, for Ph.D., begun in 1949 by the end of 1952. (Style—in general, authors in particular. Different trends varities in style.)

Psychology

1. Mrs. S. Rai, "The Play habits of children in the Nursery School" for M.Ed., begun in 1946 ended in 1947. Partly Published. (Play is preparation for life. Play habits of children belonging to different age groups in 3 to 4 years ; 4 years to 8 years. Play habits are almost universal all over the world—Forms of play an indication of the level of mental development, the social status, which children belong, family relationship, experience with the environment, etc.)

Economics

" Foreign trade of India in Ag. commodities."

Physics

1. M. B. Karnik, Lecturer, A study of plasma oscillations in an electrical

discharge tube, for Ph.D., completed in 1953. (A new method, using cathode ray oscillograph is deviced to detect the plasma oscillations. It is applied in the region where joshi-effect is present. It is also extensively studied in high pressure (130 mm.) high voltage (10 k.v.) electrical discharge.)

Electro-static deposition of flock, begun in November, 1951 ended in January 1952, Published by The Bhor Industries Ltd. (*via* Poona). (A high voltage D.C. circuit is deviced for coating cloth with light material such as a flock. On the laboratory scale artificial velvet is prepared. A small unit for cottage industries is also deviced.)

Chemistry

1. K. P. Buch, Study of soap gals during gelation in some organic media, for M.Sc., Ph.D., begun in June, 1951. (Of various properties of sodium stearate in Niyol, Benzyl alcohol pinene. At present the phase study of sodium oleate in octyl alcohol.)

2. V. K. Atre, Chemistry of colouring matter occuring with indigenous Lac, for Ph.D., begun in June, 1950. (To isolate, investigate the constitution of and study the various chemical aspects of colouring matters.)

Marathi Samshodhan Mandal,

Mumbai Marathi Granth Sangrahalaya

Marathi Language and Literature

1. Anant Kakba Priolkar, (Director and Reader), Critical Edition of Mukteshwar's Mahabharata, begun in 1948. Mukteshwar's Adiparwa, Fascicule I, Published by the Marathi Samshodhan Mandal, 1951.

2. Krishnaji Bhikaji Kulkarni, Text books in Marathi in the 19th Century, their authors, and their effect on the structure of the languages, for Ph.D., begun in 12th August 1948 ended in 12th August 1953.

3. Prabhakar Ramchandra Kokil, Autobiographical elements and autobiographies in Marathi Literature, for Ph.D., begun in 11th August 1949 and ended in 11th August 1953.

4. Shriniwas Madhusudan Pinge, Study of and contribution to the Marathi language and literature by the Europeans, for Ph.D., begun in 10th November 1949 ended in 10th November 1953.

5. Sakharam Gangadhar Malshe, Linguistic and Literary study of Father Thomas Stephen's Marathi Christian Purana, for Ph.D., begun in 6th December 1950 likely to be completed in 6th December 1954.

6. Manohar Laxmanrao Sardesai, Linguistic, Literary and Historical study of the French Jesuit Father Etienne de la Croix's Marathi Purana of

St. Peter printed in 1629, for Ph.D., begun in 23rd January 1952, likely to be completed on 23rd January 1956.

Marine Biological Institute

Marine Biology

1. Brig Jaggi, Bionomics of Megalops Cyprinoides with special reference to its respiraton and development of Air Bladder, for M.Sc., begun in 2nd August 1952 and likely to be completed 2nd August 1954.

2. Miss Manorama Menon, Comparative Anatomy, Histology of the alimentary canal and the rate of digestion in some of the common Elasmobranchs of Bombay Coast, for M.Sc., begun in 7th December, 1951 likely to be completed on 7th December, 1953.

3. B. F. Chhapgar, Crabs of Bombay, for M.Sc., begun in 7th December, 1951 likely to be completed on 7th December 1953.

4. R. G. Dandekar, (Junior Research Assistant), Studies on the Bombay Lug Worm, for M.Sc., begun in 14th August 1952 likely to be completed 14th August 1954.

5. M. R. Ranade, "Occurrence of Arenicola in Bombay," begun in March 1952 ended in 1952. Published "Current Science."

Fisheries

1. Dr. C.V. Kulkarni, "Hilsa Fisheries in The Narbada River," completed in 1951, Published The Journal of The Bombay Natural History Society, Vol. 49, No. 4.

2. Dr. C.V. Kulkarni, "A New Genus of Schelbeid catfished from Kolhapur Northern Section of Western Ghats," completed in December, 1952.

3. Dr. C. V. Kulkarni, "Some significant records of fish from Kolhapur Northern Section of Western Ghats," completed in 1952. Published "Current Science".

4. Dr. C.V. Kulkarni, "Growth of Catla in Tanks," Accepted for Publication.

5. Dr. C.V. Kulkarni, "Breeding habits, Eggs and early life history of the Indian Shah Hislsa ilisha (Ham.), in the Narbada River," completed in 1950. Published. Proceeding of the National Institute of Sciences of India, Vol. No. XVI, No. 3, pp. 169—176.

M.M. College of Arts & N.M. Institute of Science, Andheri

Gujarati Literature

1. Prof. Chandrakant Mehta, Professor, Mediaeval forms of Gujarati Literature, for Ph.D., completed on 18th September 1952. (Ten different forms of literature, the social, political and religious causes, responsible for

the birth and growth of those forms, the causes of their Days, and analysis of those forms according to different Rasas, types. Subject matter and manner of presentation.)

Politics

1. Miss H. N. Bhojani, Lecturer, Political Education of Modern India, for Ph.D., begun in 20th July 1952, not completed.

Old Gujarati

2. Dr. A. S. Gopani, Professor, (*i*) *Yogaratnakara*, For no degree, Have been working at them for the last 3 years, Completed, awaiting publication. (Both the works have been edited from almost all available manuscripts. Equipped with exhaustive introductions in which comparative studies regarding different schools of medicine and predictive astrology have been presented. Supplemented with Indexes and appendices.)

Sanskrit

(*ii*) *Jataka Samhita*, For no degree, Have been working at them for the last 3 years, Completed, Awaiting publication. (Both the works have been edited from almost all available manuscripts. Equipped with exhaustive introductions in which comparative studies regarding different schools of medicine and predictive astrology have been presented. Supplemented with Indexes and appendices.)

Bhavan's College

Botany

1. L.K. Srivastava. A contribution to the Embryology of the family Euphorbiaceai. Likely to be completed after 3 or 4 months. Work was started on September 1949, for M.Sc. (The work is carried on micro and megasporogensis and the male and female gametophytes leading upto the formaton of seed. The embryo sac in the plants worked out have been found to be of advanced type and the chromosome numbers for these plants have been found out for the first time).

2. V. M. Sukkawaha. A contribution to the embryology of the family Vitaceai. Work started in September, 1949 and will be completed in 6 months time, for M.Sc. (The plants worked out are Vitis auriculata, Leea aspera and Leea Sambosina. The work has been carried out with particular attention on the embryological part. The embryo sacs of these are found to be of normal type with few variations in some stages which will be recorded for the first time. The chromosome number of Leea has been recorded for the first time).

3 D. B. Telang. A contribution to the Embryology of Taccaceae Dioscoriaceae and Typhaceae, for M.Sc. (The work is carried out on Micro. and Megasporogenesis and male and female gametophyte of Tacca Pinnatifida, The microsporogenese and male gametophyte of Dioseconia dinona, megasporgenesis and female aemetophyte of Typha anguistata. Abnormal types of development in embryosac in

Tacca has been observed. The research is still in progress at this time.

4. Miss Nalini K. Parulekar, Anatomy of convolvulaceae and Solanaceae work was started in March 1948, and will be completed within two or three months, for M.Sc. (The stem and leaf anatomy of eighteen plants from convoluvalancea and thirteen plants from Solanaceae is dealt with in the first two parts, while the third part consists of the floral anatomy of four plants from convolvulanceae and five plants from Solanaceae. Due to the climbing habit convolvulaceae presents many interesting abnormalities in secondary growth of the stem).

5. Miss Indu L. Bhagat. A contribution to the Embryology of the family cucurbitaceae. Work was started in September 1949, for M.Sc. (The work is carried on micro and Megasporogenesis and the male and female gametothytes leading upto the formalida of seed, of the three plants, cucumics trigomes, Melothria maderespatara, coecinia Indica. Embryo sacs in the plants worked out are found to be of normal type, with few variations in some stages which has been recorded).

Research & Control Division, Raptakos Brett & Co., Ltd.

Chemistry

1. K. G. Shenoy, Haemopoietic vitamins, for M.Sc., begun in September, 1951 likely to be completed in September 1953. (Microbiological method for the determination of vitamin B_{12} has been standardized. The vitamin B_{12} content of Indian cattle livers and liver extracts derived therefrom are being studied).

2. M. S. Fatterpekar, Vitamin A and Provitamin A, for M.Sc., begun in September 1951 likely to be completed in September 1953. (Studied different methods of preparing emulsions, their stability and particle size. The stability on storage of vitamin A as alcohol, acetate, palmitate, etc., in oily solutions and aqueous emulsions is being studied).

3. G. B. Ramasarma, (Teacher), Vitamin A and Provitamin A. (Studied different methods of preparing emulsions, their stability and particle size. The stability on storage of vitamin A as alcohol, acetate, palmitate, etc., in oily solutions and aqueous emulsions is being studied).

R.A. Podar College of Commerce & Economics, Matunga

Commerce

1. N. P. Jain, Economic Possibilities of River Valley Schemes in India, for M.Com. Part I, begun in December, 1950 ended in January 1951. (Benefits of flood Control and Economic significance of control of soil erosion. Analysis of Irrigation possibilities. Electric Power and its Economic effects. Navigation and Miscellaneous possibilities. Approach to Regional Planning.)

2. G. P. Palekar, The Technique of Market Research, for M. Com. Part I, begun in July, 1949 ended in December, 1951. (Scope and importance Marketing Research in India current assignment and practice—future. Organisation-procedure-Preliminary steps-(Investigation and Planning) collection of data (Library research and solicitation). The questionnaire method-Processing the collected data (Editing, classification, Inter-pretation and presentation). Other methods of field investigation (panel, observation, experimental). Eiilogue).

Secondary Training College

Education

1. Kumari Lalita Sanzgiri, Bal Vangamaya in Marathi, for Ph.D. in Education, begun in 16th July 1951 likely to be completed in May, 1954.

2. M. H. Patwardhan, Efficiency of the Primary Teachers for Ph.D., in Education begun in 16th July, 1951 likely to be completed in May, 1954.

Seth G. S. Medical College

Animal Physiology

1. Dr. A.C. Duarte Monteiro, B.Sc., M.B.B.S., carrying on investigation under the guidance of Prof. K. C. Batliwalla, M.B.B.S., Ph.D., Professor of Physiology, Some aspects of Histological studies of the Islets of Langerhans, for M.Sc., begun in August, 1947, ended in August, 1952 (Various fixatives and staining methods were employed to study the histological structure of the Islets of Langerhans of various species. It was observed that the best fixative was Bouin's Fluid and the most satisfactory staining method was that of Gomori's (1941).

Bio-Chemistry

1. D. B. Desai, M.Sc., Some aspects of Nicotinic Acid Metabolism (*a*) Biosynthesis of nicotinic acid in germinating seedlings, for Ph.D., begun in 1950 ended in 1952, being sent for publication. (It has been shown that Tryptophane is a precursor of nicotinic acid in germinating cereals and pulses and that the alkali labile precursor of Nicotinic Acid forms a part of side reaction in the chain of Biosynthesis of Nicotinic Acid.)

2. Smt. Prema Fatterpekar, M.Sc., *Studies in Fat Metabolism*, (*a*) Effect of carbohydrates on fat absorption, for Ph.D., begun in 1950 ended in 1952, Published in Indian Physician 1952. (Carbohydrates have variable effects on fat absorption and probably it is due to the process of phosphorylation of sugars.)

(*b*) Nutritive value of Vanaspati (On otherwise adequate diet there is no difference between the nutritive value of hydrogenated oil and the parent vegetable oil).

(*c*) Effect of dietary fat on tissue fat.

3. Smt. Vidya Pradhan, M.Sc., *Studies in B-Complex Metabolism in Fish* (*a*) Thiamin and Riboflavin contents of tissues, for Ph.D., begun in 1950 ended in 1953, Published in Ind. J. Med. Sci., 1951. (Some tissues of salt water fishes in the Bombay water are rich in total thiamine and riboflavin. There is seasonal variaton in these contents.)

   (*b*) Seasonal variations in the tissue contents.

4. J. D. Jhaveri, M.Sc., Growth and studies of some *indigenous strains of Yeast*, (*a*) Effect of protein source on the growth of yeast, for Ph.D., begun in 1950 ended in 1952 (The indigenous strain of yeast studied showed that these could utilize the hydrolysed oilcakes as a source of nitrogen in place of Peptone for good growth.)

5. P. G. Tikekar, B. Sc., The effect of Methyl Cholenthrene on liver and enzyme metabolism in rats, (*a*) The effects on methionine and choline content of liver, for M.Sc., begun in 1949 ended in 1952,, ((1) The detoxication of this carcinogen practically occurs by way of methylation in the tissue. (2) The Estarase (Butyrin) activity in serum of rats is decreased due to the chemically induced tumors.)

   (*b*) The effect on the absorption activity in blood.

6. M. K. Kelkar, B. Sc., Studies in Calcium and *Phosphorus metabolism*, (*a*) The phosphatase (alkaline) content in normal and rachitic infants, for M.Sc., begun in 1950 ended in 1952. (It is seen that Calciferol in toxic doses has primary effect on the Phosphor is metabolism.)

   (*b*) Effect of graded dose of Calciferol on Ca and Phosphorus metabolism in rats.

7. B. Y. Nadkarni, B.Sc., Physiological availability of *essential nutrients*, (*a*) Physiological availability of nicotinic acid, Thiamine, and riboflavin from cereals and pulses for M.Sc., begun in 1950 ended in 1952. (The chemical estimate of Vitamin is not a true estimate of the nutritionally available vitamin. The latter is always lower than the former and per cent. availability depends on the type of the grain. Cooking improves the availability.)

8. Smt. Shanta Kelkar, B.Sc., *Studies in Metabolic inhibition*, (*a*) Cocarboxylase inhibition by Polio virus and certain fish enzymes, for M.Sc., begun in 1950 ended in 1953. Published in Current Science. (1) Thiaminase from Bombay Duck is inhibited by acetaldehyde a normal product during pyruvic acid oxidation. (2) The serum of polio-infected monkeys show less carboxylase activity.)

9. V. M. Damle, B.Sc., Studies in Calcium and Phosphrus *metabolism*. (*a*) The effect of toxic doses of Calciferol on nitrogen excretion, for M.Sc., begun in 1950 ended in 1953. (The toxic doses of vitamin D, induces higher nitrogen excretion in urine and that major increase is in urea.)

10. K. R. Juvale, B.Sc., Progesterone metabolism in women under

different conditions, for M.Sc., begun in 1950 ended in 1953, (In progress.)

11. V. S. Rout, B.Sc., The effect of strain on the Vitamin contents of grains, for M.Sc., begun in 1951 ended in 1953, (In progress.)

12. D. S. Nadkarni, B.Sc., The effect of protein nutrition on urea clearance in human subjects, for M.Sc., begun in 1950 ended in 1952. (The level of protein intake (veg. or animal) of an individual has profound effect on urea clearance. This is due to urea excretion in the urine. Other components in the Vanslyke equation remain almost constant.)

13. M. R. Parulekar, B.Sc., The effect of media on vitamin contents of indigenous strains of Yeast, for M.Sc., begun in 1951 ended in 1953, (In progress.)

14. S. M. Vellary, B.Sc., *Studies in Nitrogen Metabolism*, The effect of strains on the protein value of cereals and pulses, for M.Sc., begun in 1951 ended in 1953, (In progress.)

15. D. S. Khale, B.Sc., *Studies in Fat Metabolism*, (*a*) Stability of Vit. A (Synth.) in vanaspati, for M.Sc., begun in 1951 ended in 1953, (Synthetic Vit. A is stable in hydrogenated oils for 6 months in sealed tins and 6 weeks in open tins with a loss—20—5 p.c.)

(*b*) The effect of cholesterol feeding on tissues sterol in rabbits.

16. Smt. Jai Kummana, B.Sc., Studies in Nitrogen Metabolism with special reference to Amino Acids, for M.Sc., begun in 1951 ended in 1953, (In progress.)

Medicine

1. Dr. V. G. Daftary, M.B.B.S., Research Fellow, Anaemias in Ankylostomiasis, begun in 1st April 1949 ended in 31st March 1951. (This was a study of 96 unselected patients showing ova of Ankyostoma duodenale in their faeces. These cases were studied further by undertaking detailed haematological and biochemical investigations, relevant serological studies and an egg count in the faeces. 74 patients were anaemic and 22 did not show any anaemia. In the whole group there was no constant correlation between severity of anaemia and severity of the parasitic infection as judged by the egg count.)

2. Dr. H. R. Guard, M.B.B.S., Research Fellow, Age Changes in Arteries, 1st June 1949, ended in 31st May 1951, Sent for publication to the Ind. Jr. of Med. Research, (This was a study of age changes in a arteries on 130 autopsies. The arteries included the various representative portions of the vascular tree namely the aorta, carotids iliacs coronaries cerebrals, renal and posterior tibials. These were subjected to detail study after staining them with suitable stains.)

3. Dr. (Miss) S. S. Setna, M.B.B.S., Research Fellow, Anaemias and Plasma Proteins in Injuries, begun in 1st July 1950, ended in 30th

June 1952. (This was a detail study of 43 cases. Three groups of cases were investigated (1) Cases with operative injury excluding those wherein loss of blood, before, during or after operation had been signficant. (2) Cases of trauma unaccompanied by noticeable loss of blood and due to road and industrial accidents. (3) Cases of burns. Detail haematologic and biochemical investigations were undertaken in these cases.)

Pharmacology

1. Dr. W.B. Bhawe, B.Sc., M.B.B.S., Asstt. Professor of Pharmacology; Some preliminary observations on the Antagonistic Action between the antihistaminic drug antistine and the posterior pituitary extract on the smooth muscle, begun in 1947 ended in 1952 (The antihistaminic drug Antistine antagonises the stimulant action of the posterior pituitary extract on the plain muscle of the excised small intestine of the rabbit.)

K. E. M. Hospital

Ophthalmology

1. Dr. Sorab N. Cooper, Teacher, Hon. Opthalmic Surgeon, Immunological properties of lens proteins, begun in April 1948, ended in December, 1952, Preliminary parts published in "Indian Physician," and Transactions of the All India Ophthalmological Society, (Lens proteins after cataract operation sometimes cause severe anaphylactic reaction. Three isolated fractions were studied immunologically, by animal experimentation, clinically and electrophoretically. We have developed the method of identifying the responsible factor and its selective desensitization, thus reducing the disastrous results of the anaphylactic inflammations).

2. Dr. T. N. Ursekar, M.B.B.S., Research Fellow, Conjunctival Bed as a receptor for Trachoma virus, begun in April, 1952 likely to be completed in April 1954 (Trachoma virus—an epithelio-trophic virus—is found in the conjunctival epithelium of human beings. It has been proposed to in oculate the trachomatous material from human conjunctivae in the conjunctival sacs of animals which have been already sensitized to various proteins, *e.g.*, tuberculin, in order to study the susceptibility of this infection.)

Surgery

1. Dr. G.D. Adhia, Hon. Asstt. Surgeon, K.E.M. Hospital and Sir Harkison Das, N. Hospital and Lecturer in Surgery, Seth G.S., Medical College, Etiology of the so-called " Idiopathic " hydrocele, begun in 1950 ended in September 1950, published in the Indian Physician, Vol. X, No. 11, Nov. 1951, pp. 295—278. (On detailed analysis of 128 patients, 74 were filarial, 8 tuberculous, 23 chronic infection, 5 gonococeal, 5 syphilitic, 9 traumatic, 1 post-operative after herniorrhaphy and 1 each due to guinea worm, virus of mump and chronic irritation of seminal fluid.)

Pediatrics

1. Dr. G.D. Adhia, Hon. Asstt. Surgeon, K.E.M. Hospital and Sir Hurkison Das N. Hospital and Lecturer in Surgery, Seth G. S., Medical College, Replacement Transfusion in Erythroblastosis Foetalis and Blood group incompatibilities giving rise to haemolytic disease of the new born, begun in August, 1950 Still contd. published in Ind. J. Med. Sc., Vol. 5, No. 6, June 1951, pp. 267—269 (Upto date out of 6 replacement transfusions done for Erythroblastosis foetalis, 3 are alive and well. In Indians even first born child is commonly affected.)

2. Dr. G.D. Adhia, Hony. Asstt. Surgeon, K.E.M. Hospital and Sir Hurkison Das N. Hospital and Lecturer in Sergery, Seth G. S. Medical College, Cooley's anaemia with special reference to treatment, begun in 1949, Still contd. published in Ind. Med. J. Sc., Vol.4, No.1, Jan. 1950, pp. 8, 10, (Cooley's anaemia is common in Indians. Packed all transfusion is the only treatment available at present Vit. B. 12, non-carbinol urine fractions from urine of polycythaemia rubra urea patient to organic cobalt has failed.)

Medicine

1. Dr. G.D. Adhia, Hon. Asstt. Surgeon, K.E.M. Hospital and Sir Hurkison Das N. Hospital and Lecturer in Surgery, Seth G. S. Medical College, Replacement transfusion in general, begun in 1951 Still contd. published in Ind. J. Med. Sc., Vol. 6, No. 1, Jan. 1952, pp.9—15. (Replacement transfusion can raise haemoglobin percentage from lowest to highest level without loading the heart.)

Haematology

1. Dr. J. C. Patel, Hon. Physician, Standardization of the Liver Extracts of the Indian Manufacturers, begun in 1949 Still contd. (Patients showing Narcocytic anaemia and megaloblastic marrow were selected. After base-line studies, quantity of Liver Extract to be tested was given intramuscularly in two equal divided doses on first and second day of the treatment. Improvement was judged by reticulocyte response and weekly rise in Haemoglobin and erythrocytes. Response to the Liver Extract calculated by the formula of Della Vide and Dyke.)

Psychiatry

1. Dr. M.R. Gaitonde, M.B.B.S., Research Fellow, Narcotherapy, begun in 1st April 1952 likely to be completed in 31st March 1954. (The purpose of this research is to find out the value and limitations of various drugs in shortening the duration of psychotherapy in various psychoneurotic conditions. At the moment Metherdrine, Pentothal and carbondioxide are under investigation. In due course of time Trilene and Nitrous oxide will also be subjected for investigation.)

Siddharth College

Chemistry

1. Mr. G. B. Vaidya (*i*) Condensation of phenols and phenolic ethers with β aryl glutaconic acids, for M.Sc., begun in 1950 ended in 1953,

(*ii*) Demethylation of (O methoxy phenyl) glutanic acids.

(*iii*) Elimination of accetic acid in the decarboxylation of organic acids.

2. M. S. Pavri, (*i*) Elimination of accetic acid in decarboxylation of organic acids, for M.Sc., begun in 1951 ended in 1953. (A entirely new class of 4 aryl coumarins has been discovered).

   (*ii*) A new method of synthesis of 4 aryl coumarins.

3. D. Y. Kasralkar, (*i*) Condensation of phenols and phenolic ethers with substitute cinnamic acids, for M.Sc., begun in 1952 likely to be completed in 1954.

   (*ii*) Elimination of accetic acid during decarboxylation of organic acids.

Tata Institute of Fundamental Research

Theoretical Physics

1. Prof. H. J. Bhabha, and Mr. Surya Prakash, Generalized Wave Equations, for Ph.D., begun in 1949 Completed in September 1952, Published Partly in The Indian Academy of Sciences, Bangalore, (Generalized Wave Equations).

Cosmic Radiation

1. A. S. Rao, and co-workers, Experimental work on " High altitude measurement of different components of cosmic radiation by balloons." (High altitude flights have been made at Delhi, Poona and Bangalore.)

2. Prof. B. Peters and co-workers, Experimental work. (Studies in cosmic radiation by nuclear emulsion techniques).

Nuclear Physics

1. Dr. D.Y. Phadke and co-workers, Experimental work on 'Instrumentation techniques in nuclear physic.' (Radiation meters suitable for Geological Survey for radioactive materials produced in the Laboratory. Laboratory type instruments like scalers and counting rate meters also developed.)

2. Dr. R. Ramanna, Dr. B. V. Thosar and co-workers, Experimental work. (On scintillation counters, Ionisation chambers, β-ray spectroscopy.)

Mathematics

1. Prof. D. D. Kosambi, Prof. F. W. Levi, Prof. K. Chandrasekharan, (Various research papers published. A mathematical monograph 'Typical Means' by Prof. Chandrasekharan published under the publication project.)

Topiwala National Medical College

Pathalogy and Bacteriology Department

Chemistry

1. D. S. Nadkarni, B.Sc., Effect of High Protein Diet on Urea Clearance Test, For the M.Sc., Degree in Chemistry, begun in September 1950, ended in December, 1952. (Effect of high protein Diet on Blood Urea—Clearance of vegetarian and non-vegetarian—Indian normals between the ages of 20 and 40 is being studied. Blood Urea Clearance in Indian normals is also being studied.)

PHYSIOLOGY DEPARTMENT

Medicine

1. Dr. V. A. Rane, M.D., F.C.P.S., Teacher, Temp. Assistant Professor of Physiology, (*i*) Pregnancy Test using male frog, begun in January, 1951, ended in 1952. (To find out if the woman is pregnant or not by injecting her urine into the ventralymph sac of locally available frog Rana tigrinae and examining the frog's urine for the presence of sperms from half an hour onwards.)

   (*ii*) Determination of sex of the child during pregnancy, begun in March, 1952, likely to be completed by six months. (To find out the sex of the child while in the uterus, by injecting some of the body fluids, *e.g.*, salig (also sweat and tears from the pregnant-woman into the dorsal lymph sac of the locally available male frog Rana tigrinae.)

Biochemistry

1. S. N. Narayanarao, M.Sc., Teacher, Asstt. Professor of Bio-chemistry and Bio-physics, (*i*) Creatinine coefficient—amongst Indian adult subjects, begun in February, 1952, ended in April 1953. (The investigation is undertaken with a view to determining average standard creatinine coefficient values for Indian subjects.)

   (*ii*) Studies of the digestibility of different paddy and rice products by Ptyalin, begun in April, 1952, likely to be completed in August, 1953. (The study is intended to find out if the different paddy products, such as Poha, La Murmura, etc., are equally digestable by Amylum and throw-light on the structture changes that is likely to occur by the different processes.

Willson College

Physics

1. K. G. Vohra, Study of Radioactive contamination of gases atl ow concentration. For Ph. D. begun in December, 1949, ended in December, 1952. (An apparatus has been constructed for collecting radioactive samples from cantaminated rooms, winds and gases. An electronic recording apparatus has been constructed for

recording pulses from proportional counters. A study has been made of the radioactivity of Monsoon winds over Bombay.)

St. Xavier's College

Microbiology

1. M. J. Albuquerque, Studies on Bombay Duck, Bombil, for M.Sc., begun in 1948, ended in 1950. (Aspects of Microbiology and Epidemiology.)

2. J. R. Vakil, Rancidity in Coconut oil, for M.Sc., begun in 1948 ended in 1950, to be published in two papers, in press, Phytomorphology. (Microbiological aspects.)

3. S.N. Mehta, Plant Antibiotics, for M.Sc., begun in 1948 ended in 1951, Published in two papers, in press J. Bomb. Univ. (Thespesia populnea, Bryophyllum calycinum.)

4. R. S. Nayak, Antagonism among Intestinal Bacteria, for M.Sc., begun in 1948, ended in 1951. (Stale agar, autolysate etc., on growths. Also the effect of Hig etc. on intestinal bacteria.)

5. S. R. Khambatta, Micro-organisms associated with the Earthworm, G. I. T., for M.Sc., begun in 1949, ended in 1952. (Several Pseudomonas decomposing Oxalate isolated Papers being prepared.)

6. P. V. Divekar, M.Sc., A contribution to the study of plant anti-biotics, for Ph.D., begun in 24th November 1950, likely to be completed in 1954.

7. J. de Sa, M.Sc., A contribution to the study of the anti-bacterial principles from Indian Medicinal Plants, for Ph.D., begun in 24th November 1950, likely to be completed in 1954.

8. A. C. Maniar, M.Sc., Microbiological and chemotherapeutic investigations on some plants of Saurashtra, for Ph.D., begun in 22nd July 1952, likely to be completed in 1955.

9. Miss G. S. Sujan, B.Sc. (Hons.), A contribution to the studies on the relative anti-bacterial action of the three known anti-bodies of anti-typhoid sera, *viz.*, H, O and Vi, for M.Sc., begun in 12th October 1949, ended in 1953.

10. G. C. Shrivastava, B.Sc., Study of the enzymic activities of S. typhosus with reference to its virulence and antigenicity, for M.Sc., begun in 17th July 1951 likely to be completed in 1955.

11. Miss F. Peroira, B.Sc., (Hons.), A study of the anti-bacterial action of certain natural and synthetic compounds with special reference to M. tuberculosis var. hominis, for M.Sc., begun in 24th July 1951 likely to be completed in 1955.

Biochemistry

1. S. M. Pathak, Carbohydrate metabolism in Indian fruits, for M.Sc.,

begun in 1948, ended in 1951, one paper published and another in press. (Achras sapota worked out in main.)

2. R. S. Broker, Evaluation of Indigenous Drugs, for M.Sc., begun in 1950 ended in 1952, published 1 paper in Current Science, 2 in J. Indian Med. Research. (" Nagbhasma " and Sidereny tomentosum worked out.)

Geology

1. D. N. Elchidana, The Geological Features and Petrographic studies of the Rocks occuring in the northern part of the Island of Salsette, Bombay, for M.Sc., begun in 1947. (The thesis presents the results of field and laboratory investigations. Laboratory work consists mainly of microscopy and chemical analysis. Different rock-types were distinguished and with the help of field and laboratory data geological sequence of the different rock types was worked out. The area is composed of Deccan Traps.)

2. S. B. Kalelkar, The Geological Features and Petrographic studies of the rocks occuring in central Lunavada Taluka, Panchmalahs, Bombay, for M.Sc., begun in 1949. (The thesis presents the results of study of metamorphic rocks of the central Lunavada Taluka. Chemical analysis were carried out for few, important and relevant specimens. Microscopic investigations were made. The results of field data and chemical and microscopic investigations were utilised to interpret the geological features of the country.)

History

1. Agaskar, M. S., Mahadji Sindhia, for Ph.D., begun in 6th January 1948 ended in 1952.

2. Abbas Ali, M. Mysore History—Down to 1761, for M.A., begun in 18th July, 1949, ended in 1952.

3. Miss Bhavnagiri, K.S., Wellesley's Struggle against French in India, for Ph.D., begun in 1st July, 1946, ended in 1952.

4. Cleetus, K. J. S., The Pol. & Econ. set up of the Mohenjo Darians. Some aspects of Wellesley's Administration, for Ph.D., begun in 15th July, 1952, likely to be completed in 1954.

5. Deodhar, Y. N., Nana Phadnis—External Affairs of the Maratha State, for Ph.D., begun in 13th July, 1951, likely to be completed in 1954.

6. Rev. Dhammananda, D. H., Indian influences on Ceylonese Culture, for Ph.D., begun in 17th September, 1951, likely to be completed in 1954.

7. Miss Engineer, F. J., The place of Ramanuja in the Development of Indian Intellectual Culture, for Ph.D., begun in 1948, ended in 1952.

8. Fernandes, G. H., The Transfer of India's Capital to Delhi, for Ph.D., begun in 26th June, 1952, likely to be completed in 1954.

9. Habibullah, Shaik, Bahadur Shah the II—The Last Moghul, for Ph.D., begun in 7th August, 1946, ended in 1952.

10. Hatalkar V. G., The Relations between the French and the Marathas, 1688—1808, for Ph.D., begun in 21st March, 1945, ended in April, 1950.

11. Hati, K.R., The Sahi Rulers of Udabhandapura—Study of the "Watch Dogs" of the Indian Frontiers (c. 870 to 1026 A. D.), for Ph.D., begun in 5th July, 1945, ended in 30th June 1950.

12. Gokhale, K.V., Maratha History—Nana Phadnis-Internal Affairs of the Maratha State, for Ph.D., begun in July, 1951, ended in 1953.

13. Kamat, V. V., Religious Background in the History of Marathas in the 17th Century, for Ph.D., begun in 2nd July, 1947, ended in 1952.

14. Karnik, M.R. The Vinaya Pitaka—A Study in Buddhist Monastic Culture, for Ph.D., begun in 4th April 1952, likely to be completed in 1954.

15. Miss Kothare, P. N., Women in Epic Society, for Ph.D., begun in 2nd November, 1851, ended in 1953.

16. Khobrekar, V. G., Balaji Bajirao and Expansion of Maratha Power in South India, for Ph.D., begun in 15th July, 1947, ended in 1952.

17. Miss Krishnaswamy, A., Krishnadevaraya of Vijay-Nagara, for Ph.D., begun in 7th January, 1948, ended in 1952.

18. Rev. Menezes, W. J., Malabar and the Portuguese, for Ph.D., begun in June, 1952, likely to be completed in 1954.

19. Miss Parekh, U. H., Ancient Indian Inscriptions—A Cultural Study, for Ph.D., begun in 6th September 1951 ended in 1953. Some aspects of Barjut and Asoka Inscriptions—A paper submitted to the Indian History Congress, 1951.

20. Miss Pradhan, S. N., Jonathan Duncan, for M.A., begun in 8th August 1950, ended in 1953. Some aspects of Barjut and Asoka Inscriptions—A paper submitted to the Indian History Congress, 1951.

21. Pereira, J. V., Art and Society in Ancient India, for Ph.D., begun in 3rd September 1951, ended in 1953.

22. Righsinghani, K. S., Frontier Policy of the British in India, for Ph.D., begun in 14th January 1951, ended in 1953.

23. Miss Sanjana, R. J., The Story of the Proto Indo-Dravido Mediterranean Bldg. Development and their Influence, for M.A., begun in July, 1945, ended in April 1950.

24. Shrivastava, B.K., Angrias, for Ph.D., begun in 21st November 1946, ended in 1952, Book—Angreys of Kolaba in British Record. (10c,

Gokhale Bldg., Tilak Rd., Poona 2. In the Press, The Angreys (Original Marathi Documents from Peshwa Daftar and Private Sources).

25. Shah, Y. B., Mahayana-Buddhist—Contribution to Indian Culture, for Ph.D., begun in 20th September 1951, likely to be completed in 1954.

26. Miss Thairani, K., British Political Missions to Sind in the 19th Century, for Ph.D., begun in 5th January 1949, ended in December, 1950.

27. Miss Vijayakar, M. M., Ancient Indian Kingship, for Ph.D., begun in 6th October 1951, likely to be completed in 1954.

28. Rev. H. Heras, S. J., Studies in Proto-Indo-Mediterranean Culture, completed in 1952. Will be out by the end of this year.

29. Prof. Moraes, G. M., Bibliography of Indian History for the year 1943, completed in 1951, published by Konkan Institute, Bombay.

30. Prof. Coelho, W., Hoysala Vamsa, completed in 1952, published by Indian Historical Research Institute.

31. Dr. Gokhale, B. G., Ancient Indian History and Culture, completed in 1952, Asia Publishing House, Bombay.

CALCUTTA

Ancient Indian History and Culture

1. Dr. Sudhakar Chatterji, M.A., Ph.D., Lecturer, (*i*) The Achaemenids in India, Published in Calcutta by the Calcutta Oriental Press in March, 1951. (The rule of the Achasmenids in India, Tribal immigrations in Achaemenid India ; Foreign notices of Achaemenid India).

   (*ii*) Political History of Northern India c. 450—750 A. D., (The last days of the Gupta rule ; The later-Gupta-Maukhari struggle ; The age of Harsha ; India after Harsha's death.)

2. Dr. Golapchandra Ray Choudhury, M.A., Ph.D., (Lond.), Lecturer, A Detailed Survey of the Political History of the Western Chalukyas, for publication in the Calcutta University Press. (The monograph deals with the political history of both the branches of Vatapi and Kalyani Chalukyas as also of several of the minor branches).

3. Nalini Nath Das Gupta, M.A., Lecturer, (*i*) " Early Bengal's Contribution to Brahmanical Philosophy " (Article), Published in Indian Culture, Vol. XV, 1950.

   (*ii*) Buddhism in Kamrupa " (Article), published in Indian Historical Quarterly, December, 1950.

   (*iii*) " History of Buddhism in India after 1000 A. D. (Chapter for the Vth Volume of the Bombay History of India).

   (*iv*) The medieval Bengali text of the Krishnamangala by the poet Parasurama.

4. Durga Das Mukherji, M.A., Lecturer, Study of the " Administrative Institutions of Ancient India from Epigraphic Sources.

5. Dr. B. C. Sen, M.A., Ph.D., (Lond.), Lecturer, History of India, 712—1205-Q. Retrospect and a Standpoint, Written for Pres. Address, Section II, Ind. Hist. Congress Nagpur Session, December 1950, Published in the Calcutta Review, 1951.

6. Dr. K. Ganguli, M.A., D.Phil. Asst. Curator, Ashutosh Museum, " Jewellery in Ancient India and is now engaged in collecting materials for a monograph on "Ancient Indian Pottery, Textile and Ivory."

7. Prof. J. N. Bannerjea, M.A., Ph.D., F.A.S., (*i*) Vishnu and Surya—A study in Vishnuite Icons—with a monograph, Printed off and is going to be published soon.

   (*ii*) " History of the Brahmanical Sects."

Commerce

1, Anil Kumar Mukherjee, Indian Sugar Industry—A study in Dynamic

Economics, for D.Phil., begun in 1950, likely to be completed in 1953.

2. Nirmal Prakash Dey, Trade Relations between India and France in the 18th Century, for D.Phil., begun in 1950, likely to be completed in 1953.

3. B. T Nagaraj, Stock Exchange with special reference to India, for D.Phil., begun in 1951, likely to be completed in 1953.

English

1. Dr. M. M. Bhattacharya Head of English Dept., The Pictorial Element in Pre-Raphaclite poetry., begun in 1952, likely to be completed in 1954.. (The connection between pictures and poetry is being traced. The pictorial method and the method tapestry-weaving are also sought to be illustrated with reference to Pre-Raphaclite poetry.

2. P. R. Sen, Lecturer, Studies in Ben Jonson.

3. Dr. Srichandra Sen, Lecturer, (*i*) Studies in Daniel De Foe. begun in 1944 and completed, Published a book and 3 articles, De Foe's art as story teller and its development has been traced from the beginning of his literary career.

   (*ii*) Novel in English during last 20 years, A completed stories and another recently started, begun in 1935 and likely to be completed in 1953, (Technical trends in modern English novel on the main subject of enquiry).

4. K. C. Lahiri, Tutor, (*i*) Influx of sociology in contemporary literature, (Influx of sociological materials in contemporary literature is being traced and the use of psychological methods being studied.)

   (*ii*) Studies in Indian scripts.

5. P. C. Ghosh,

   (*i*) Symbolisn in Blake's poetry.

   (*ii*) The modern English novels.

Economics

1. Bimalendu Dhar, M.A., Teacher, Growth and utilisation of Sterling Balances of India since 1939, D.Phil (Awarded), begun in 1946 and completed in 1951.

2. Amrita Datta, M.A., India's Balance of Payments in the Post-war priod 1946—52, for D.Phil., begun in 1950, likely to be completed in 1953.

3. Dhruba K. Datta, M.A., Industrial Management in India, for D.Phil., begun in 1949 and completed in 1951,

4. Arun Kumar Datta Gupta, M.A., State Financing of Private Enterprise after World War II, for D:Phil., begun in 1950, completed in 1952. Parts published in the Calcutta Review, Indian Journal of Commerce, etc.,

5. Anil Kumar Chatterjee, M.A., Conditions of Jute Mill Workers in West Bengal, for D.Phil., begun in 1950, to be completed in 1953.

6. Miss Sabita Bannerjee, M.A., Plan and Problems of small and medium sized industries in the economy of West Bengal, for D.Phil., begun in 1951, to be completed in 1953.

7. Gobinda C. Mandal, Indian Income Tax 1922—1952 for D.Phil. begun in 1950 likely to be completd in 1953.

8. Ambica Ghosh, Teacher, Stalistical study of the Agricultural Economy of Bengal with special reference to class—relation and occupational structure for D.Phil. begun in 1949 First submitted in February 1951 and again submitted in February 1952 completed in February 1952 (Descriptive and analytical study of changes in class and occupational structure and ownership of land in Bengal.)

9. Sudhansu Bhusan Mukherjee, Teacher, Demography of Burdwan Division: Patterns and Problems for D.Phil. Begun in May 1942 and completed in June 1952, (Quantitative and qualitative analysis of population situation in moribund part of the Gangetic delta with special emphasis on ecology, urbanization, occupational shift and pressure upon means of subsistence.)

History

1. P. C. Gupta, Fort William—India House Correspondence, 1796--1800;. begun in 1950, completed about a year ago, to be published by the Government of India, (One of a series to be published by the National Archives of India. (Government of India), New Delhi.

2. N. K. Sinha, Economic History of Bengal, 1772—1793 begun in 1947 to be completed, (Based on unpublished records in the Calcutta High Court and in the record office of the Journal of West Bengal and in the District Record office.

3. Tarit Kumar Mukherji, Asst. Prof., British Relations with the Bhonsles of Nagpur and the Rana of Gohad in the 18th Century(1761—1803), for D.Phil., begun in 1949, likely to be completed in 30th June 1953. (The thesis will be primarily concerned with the British expansion in Orissa the establishment of uninterrupted line of Communication between Bengal and Madras—the state of Nagpur used as buffer against Poona-Mysore Combination a studies in British diplomatic relations with the country powers—Rana of Gohad in connection with Madhavji Sindhia.

4. Nanigopal Dutt, Lecturer, Relations of Hyderabad and the East India Co., for D.Phil., begun in 1950, likely to be completed in June, 1953. (A detailed study phase by phase on based primarily on the official records.)

3. Narendranath Das, Socio-Economic conditions in Midnapur—1760—1803, for D.Phil., begun in 1949, likely to be completed in June, 1953. (Based mainly on the District Records—will give a detailed account of the Salt industry, the effects of Maratha incursions—trade, external and internal, peculiarities of Land revenue history, criminal tribes, etc.

Modern Indian Languages

1. T. C. Das Gupta, M.A., Ph.D., (*i*) Prachin Bangala Sahityer Itihas, (A History of Bengali Literature—Premodern in Bengali ; (Relating to the history of Bengali, Lit. roughly from the 8th to the 18th century A. D. Pre-modern period.)

   (*ii*) Some Geographical and Topographical account of Bengal, in English, (A history, general account and location of various forgotten and half-forgetten places, as also of historical places, chiefly from pre-modern Bengali Literature and archaelogical evidences.)

   (*iii*) Chandi-Mangal (Manik Datta), (An edition of the work of the earliest poet of Chandimangal literature, a valuable branch of Pre-modern Bengali literature.)

2. Shashi Bhusan Das Gupta, Lecturer (*i*) Silpa-lipi (Writings on Art), completed in 1951, Published by A. Mukherjee & Co., (A book containing essays on art in general and literary art in particulars.

   (*ii*) Sri Radhar Kramavikasa, Evolution of Sri Radha, completed in 1952 Published by A. Mukherjee & Co., (On the evolution of Sri Radha and the Radha cult in India, and particularly in Bengal, through philsopohy, theology and literature.

   (*iii*) Evolution of Mother Worship in India completed in 1952.

3. Biswapati Chaudhuri, Lecturer, (*i*) Kavi Kankan Candi begun in 1950 ended in 1952, Candi, published by Calcutta University, (A semi-epic Bengali poem belonging to the 16th century.)

   (*ii*) Vaisnava Padavali, begun in 1950, ended in 1952, Published by the Calcutta University, (An anthology of Bengali Vaisnava Songs.)

4. Promothonath Bisi, (*i*) Rabindra Natya Probaha Vol. II, completed in 1951, Published by Mitralaya Calcutta, (A critical study of Rabindranath's Symbolic dramas.)

   (*ii*) Bangala-Sahityer-Nara-Nari, completed in 1952. Viswabharati Publishing Dept., (A study of some characters of Bengali fictions, plays and poetry from the earliest times to the present days.)

5. Srikumar Banerjee, (*i*) Samalochana-Sangraha, completed in 1951, Published by A. Mukherjee, & Co., (A solution of essays of literary criticism reprinted from monthly journals from 1862 to modern times, with a critical introduction on principles and standards of criticism followed in them.)

6. Maheswar Das, Lecturer, (*i*) Dhvanitatter Darsanik Bhumika, begun in 1949, nearing completetion, (The philosophic background of the Dhvani theory the basis of the Indian aesthetic.)

   (*ii*) Home of Aryans, begun in 1950, The location of the home of the Aryans from the study of the Vedas and other allied literature as opposed to the theory already in prevalence.

   (*iii*) History of Jagannath Cult, begun in 1951, (The history of Lord Jagannath as traced to the Vedic period as opposed to the prevalent theory of Buddhistic influence and origin.

Political Science

1. Jyotsna Mitra, Evolution of the Police System in Bengal, with special reference to Calcutta, for D.Phil., to be completed in two years.
2. Ansu Kumar Datta, Social and Politichal Thought in India during the 19th Century, for D.Phil., to be completed in two years.
3. Lalit Kumar Sen, The Refugee Problem in West Bengal, for D.Phil., to be completed in two years.
4. Subir Ch. Majumdar, Principal of Federation with special refugee to the Constitution of India, for D.Phil., to be completed in two years.
5. Nirmal Chandra Basu Roy Choudhury, Trends in Social Legislation in the Central Legislature of India, for D.Phil., to be completed in two years.

Pali

1. Prof. Nallinaksha Dutt, Gilgit Manuscripts.
2. Gokuldas Dey, Jatakas.
3. Dr. Anukul Chandra Banerjee, Buddhist Sects.
4. Dwijendralal Barua, Pali Grammar.

Psychology

1. Personality of delinquents with Rorschach and other projective tests.
2. Concept formation in the blind.
3. Intelligence level of the deaf and the dumb.
4. Construction of objective tests of some school subjects.
5. Nature of the perception of radiant heat.
6. Tension study in social situations.
7. Human relations in Industry.

8. Factor study in Journalism and other professions.

Applied Physics

1. Dielectric properties of indegenous materials.
2. Design of electrical measuring instruments.
3. Design of electrical machines.
4. Problems in electro-technology.
5. Spectroscopic study of heavy diatomic molecules.
6. Thermal properties of building materials.
7. Mechanics of Engineering Materials.

Applied Chemistry

1. Catalytic dehydration of ethyl alcohol for the manufacture of ethyl ether.
2. Chlorination of alcohol for the manufacture of chloroform.
3. Extraction of Titania from Bauxite sludge.
4. Study on Indian coals with special reference to coking and non-coking properties of Indian coals and solvent extraction of coals.
5. Manufacture of phosphatic fertilizer from Indian spatite.
6. Fermentative Productive of acetone butanol.
7. Production of Fluconic acid.
8. Production of citric acid.
9. Microbiology of cereal grains.
10. Search for antagonistics organisms effective against intestinal pathogens.
11. Studies on antibiotics in the storage of cereal grains.
12. Studies on the adaptability of Aspergillus Niger.
13. Biochemical Retting of Jute.
14. Studies on the utilisation of Blast furnace slag.
15. Studies on the decolorisation of glasses.
16. Preparation of ultramarine.
17. Purification of glass making sands.

18. Studies on the effect of different electrolytes on the flow properties of clay-water suspension.

19. Preparation of silica gel under different conditions and a study of its properties.

20. Studies on the plastic properties of Indian clay.

21. Studies on the colour bestoured by copper in glass.

22. Studies on the constituents of Boswellia Serrate Rox.

23. Preparation of Tri Ricionilien by solvent extraction of castor oil communicated to J. Ind. Chem. Soc.

24. Dehydration of Tri Recinolien.

25. Lubrication power of oils on Jute.

26. Preparation of surface active agents from oils *via* mono-glycerides.

27. Preparation of Rosin acid esters of castor oil.

28. Isolation of proteins from oil cakes and preparation of glues from it.

29. Studies on Cellulose nitrate, Part I. Preparation of nitrate from Cotton and study in its solubility Nitrogen content and degree of polymerisation.

30. A study on the preparation and properties of cast phenolic resin (from commercial phenol and formaldehyde).

31. Studies in Methyl Methecrylate Part I. Preparation of acetone-cyanohydrin from commercial acetone.

32. Studies in Cellulose nitrate Part II. Solubility and degree of polymerisation of cellulose nitrate from Standard Indian Contons.

33. Studies in the solubility and mol. wt. of estergem from Indian rosin.

34. Studies in methyl methacrylate (Part I). Preparation of acetone-cyanohydrin from acetone and monomeric conversion to methyl and methyl ester.

35. Studies in Synthetic Adhesive, Part I. Water-soluble phenol-formaldehyde and urea-formaldehyde resins.

36. Studies in Oil-modified alkyle resins with indigenous Phthalic anhydride,

    (*a*) Castor Oil modified, Part I.

    (*b*) Linseed Oil modified, Part II.

37. Studies on Piperitoe and its near Relatives.

38. Synthesis of Phenantherene derivatives.

39. Synthesis of Indole and Indole derivatives.

40. Vitamin K—its relation with Prothrombin and Blood-coagulation.

41. Biosynthesis of Ascorbic Acid.

42. Effect of canning on the nutritive value of Indian Food Stuffs.

43. Studies on Bound form of nicotinic acid present in cereals.

44. Extraction of proteins from different green leaves.

45. The synthesis of anti-folic acid compounds.

46. Studies on the availability of food-iron.

47. Studies on loss of nutrients during cooking of rice.

48. Studies on the thiamin content of pure bred trains of Indian rice.

49. Stability of synthetic vitamin A eaters in vegetable oils particularly hydrogenated groundnut oil.

50. Utilisation of Jute Waste for the production of moulding composition.

51. Biosynthesis of Vitamin C and its metabolic interrelationships.

52. Vitamin K. in relation to Prothrombin and Blood coagulation.

53. The synthesis of anti-folic acid compounds and studies on their chemotherapeutic activities particularly against leukemia.

54. Microbial production of B_{12} (anti-anaemia factor) and B_{12} (Riboflavin).

55. Dry hydrolysis of starch.

56. Synthesis of di-and mono-glycerides.

57. Studies in desulphurisation of coal.

58. Studies in the preparation of acetone and mesitylene from ethyl alcohol.

59. Cation active soaps.

60. Chemicals from Fats.

61. Fats to order.

62. Development of countercurrent systems in fat industries.

63. Decarboxylation of Fatty acids.

64. Decarboxylation of Fatty acids.

65. The fatty acids and glycerides of an Indian sesama oil.

66. The composition of Poppyseed oil.

67. The component fatty acids of Indian linseed oils.

68. Studies in Linoleic-rich drying oils.

    (*a*) Sunflower Seed oil.

    (*b*) Sunflower seed oil.

    (*c*) Niger seed oil.

    (*d*) Tobacco seed oil.

79. Studies in the solvent Segregation of Natural Fats.

70. Utilisation of Indian Bentonite in the refining of oils.

71. Investigation in the component fatty acids of Switenia Macrophylla.

72. Decarboxylation of Fatty acids.

73. Investigation into the component glycerides of some Indian seed fats.

74. Studies on Synthetic Drying oils :—

    (*a*) Dehydrochlorinations of halogenated fatty acids and glycerides.

    (*b*) Alkali isomerisation of unsaturated Fatty acids and Glycerides.

75. Studes on reconditioning of Rancid fats.

76. Studies in ion exchange.

Chemistry

1. Complex compounds of quadrivalent Rhenium.

2. Colorimetric estimation of Uranium, Vanadium, Molybdenum and other metals with salicylamide, salicylhydroxamic acid and salicylaldehyde-sulphonic acid and the determination of the stability of the coloured complex compounds.

3. Study on the formation and stability of the complex compounds

List of Publication in Applied Chemistry

1. P. Ray and C. Gautam, Complex compounds of, biguanides with bivalent metals Part XI, Published in J. Ind. Chem. Soc., 27, 1950, 411,

2. P. Ray and A. K. Chaudhury, Complex compounds of biguanides with bivalent metals Part XII, Published in J. Ind. Chem. Soc. 27, 1950, 651.

3. P. Ray and A. K. Chaudhuri, Complex compounds of thio-dicyandiamidine with metallic elements Part I, Published in J. Ind. Chem. Soc., 27 1950, 673.

4. P. Ray and A. K. Mukherjee, Inter-metallic complex salts, of salicylaldimine-acids with polycyclic rings Part I, Published in J. Ind. Chem. Soc. 27, 1950, 707).

5. P. Ray and B. Sarma, Complex dicyano-bis-ethylenediamine cobalt compounds, Published in J. Ind. Chem. Soc., 28, 1951, 53.

6. P. Ray and B. Das Sarma, Mono-biguanide and hetero-chelate copper complexes, Published in J. Ind. Chem. Soc., 28, 1951, 53.

7. D. Banerjee, N. N. Ghosh and P. Ray, Stability of Chromium, biguanide and phenyl biguanide complex, Published in J. Ind. Chem. Soc. 29, 1952, 157.

8. S. N. Poddar and P. Ray, Complex compounds of thio-dicyandiamidine with metallic elements, Published in J. Ind. Chem. Soc., 29, 1952, 279.

9. A. K. De, N. N. Ghosh and P. R. Roy, Stability of Cobaltic biguanide complexes, Published in J. Ind. Chem. Soc., 1950, 28, 493.

0. D. Sen, N. N. Ghosh and P. Ray, Physico-chemical studies on the stability of ethylenedibiguanide complex of Tripositive silver, Published in J. Ind. Chem. Soc., 1950, 27, 619.

11. A. Bhaduri, A note on the estimation of Aluminium by Anthranilic Acid : Published in J. Ind. Chem. Soc. 1950, 27, 281.

12. P. Ray and A. Bhaduri, Cystin as an Analytical Reagent, Published in J. Ind. Chem. Soc., 1950, 27, 291.

13. S. K. Sidhanta, N. K. Dutt and P. Ray, Resolution of tris-phenylbiguanide cobaltic chloride, etc., Published in J. Ind. Chem. Soc. 1950, 27, 641.

14. B. Das Sarma, Acid dissociation constants and basicity of biguanides and dibiguanides : Published in J. Ind. Chem. Soc. 29, 4, 217, 1952.

15. The study of rare elements, *viz.*, Germanium, Beryllium, Thorium, Uranium, Nioboium, Tantalum, and their compounds.

16. The study of the complex comounds and their instability constants.

17. Study of rare minerals and their spectrographical analysis.

List of Publication in Chemistry

1. B. C. Haldar, Physico-chemical investigations on the Complex forma-

tion between pyrophosphate ion and Beryllium ion in solution Published in Journ. Ind. Chem. So., 1950, 27, 484.

2. S. K. Nandi & D. N. Sen, Investigation of Radio active minerals of India I—Samarskite, Published in J. Sc. Ind. Res. 1950, V, 9B, 89.

3. S. K. Nandi & D. N. Sen, Investigation of Indian Radioactive minerals II—Allanite, Published in J. Sc. Ind. Res. 1950 , V, 9B, 124.

4. S. K. Nandi & D. N. Sen, Investigation of Indian Radioactive minerals III—Monazite, Published in J. Sc. Ind. Res., 1950, V, 9B, 156.

5. S. N. Nandi & D. N. Sen, Investigation on Chemical composition of Indian Triplite, Published in J. Sc. Ind. Res., 1950, V, 9B, 176.

6. R. K. Dutt & S. N. Bose, Extraction of Germanium from Sphaler8te of Nepal-Part I, Published in J. Sc. Ind. Res., 1950, V, 9B, 251.

7. R. K. Dutt & S. N. Bose, Extraction of Germanium from Sphalerite of Nepal-Part II, Published in J. Sc. Ind. Res., V, 9B, 271, 1950.

8. R. K. Dutt & S. N. Bose, Germanium in Sphalerite from Nepal, Published in J. Sc. Ind. Res., 1950, V, 9B, 52.

9. H. Bhattacharyya, Analytical Separation of Niobium and Tantalum, Published in Science and Culture, 1950, Vol. 16, No. 2, 69.

10. H. Bhattacharyya, Analysis of Binary and Ternary mixtrues of Tantaic acid, Niobic acid and Titania, Published in Science and Culture, 1950, Vol. 16, No. 3, 1211.

11. S. Banerjee, Studies on Ferri-Hypophosphorous acid system, Published in Science and Culture, 1950, Vol. 16, 115.

12. S. Banerjee, Studies on Ferri-phosphoric acid complexes, Published in Jour. Ind. Chem. Soc., 1950, 27, 417.

13. K. K. Chatterjee, On the nature of lead-acetato complex ion and the lead acetate molecule, Published in Jour. Ind. Chem. Soc., 1950, 17, 551.

14. B. C. Halder, Pyrophosphate Complexes of Nickel and Cobalt in solution, Published in Nature, 1950, 166, 744.

15. S. Banerjee and B. C. Halder, Constitution of Ferri-phenol complexes in solution, Published in Nature, 1950, 165, 1012.

16. S. Banerjee & S. K. Mitra, Studies on pyrophosphate complexes of Iron in solution, Published in Science and Culture, 1951, Vol. 16, No. 11. 5301.

17. Manisha Bose, Estimation of Beryllium in Indian Beryls by Fluorometric methods, Published in Jour. Ind. Chem. Soc., Ind. and

News Edtn. 1951, Vol. 14, No. 1, 61.

18. Manisha Bose, On the mechanism of reaction between bichomate and diphenylcarbazide, Published in Nature, 1952, 17, 213.
19. Manisha Bose and D. M. Chowdhury, Studies on the behaviour of Thorium oxalate, Communicated—Science Congress 1953.

The Institute of Radio Physics and electronics

Upper Atmosphere and Radio Wave Propagation:

(*i*) Routine observations of the hourly values of he critical frequencies and virtual heights of the various ionospheric layers were taken regularly. Monthly summaries of the observed results and predictions of region F_2 characteristics, 3 months in advance, were published regularly in the Journal of Scientific and Industrial Research. The data were recorded in the form of Monthly Bulletins which were exchanged with similar Bulletins issued by ionospheric laboratories in other parts of the world.

(*ii*) Data collected from 1944 to 1949 were analysed to obtain, (*a*) the average midday intensity of ionizing radiation responsible for region E ionization, (*b*) the rate of ion production of region E over Calcutta, (*c*) the noon-time temperature at the E and F region heights and (*d*) the earth's magnetic field in region F_2 over Calcutta.

(*ii*) Influence of lunar and solar tides on the F_2 region was studied and the amplitude and phase of the solar tidal drift of electrons calculated.

(*iv*) The theory of the structure of the D-region was developed and its reflecting properties for long and very long waves studied. Experimental observations on the absorption properties of the D-region were made and the reflection co-efficient for the Es region calculated.

(*v*) The incidence of sporadic E over the globe at different hours and seasons were analysed with a view to study the relative importance of the 3 known causes of Es ionization, namely, (*a*) meteors (*b*) thunderclouds and extra-terrestrial corpuscles. The fading of the echo returned by the Es region at Calcutta was analysed to yield information regarding the ionic density and other relevant parameters of the region. Further investigations on these lines are now bring made by a gate circuit specially constructed for the purpose. Theory of random fading was developed to clarify some observed anomalies in fading studies and a new method for the measurement of drift suggested.

(*vi*) Investigations regarding the presence and density distributions of sodium in the upper atmosphere and its effects on the night air-glow and twilight flash was made.

(*vii*) The structures of the ionospheric layers were studied by taking account the variations of recomibnation co-efficient and scale height with height. It was shown that the F_2 region is produced during day time by a sort of bifurcation process of the F_1 region and may not have a solar ionizing origin distinct from that of the F_1 region. Study of the solar cycle variation of the ionization of the Fa and F_2 regions corroborated this view.

(*viii*) The magneto-ionic theory was applied to study vertical and oblique propagation of radio waves over a curved earth. Study of the retardation was made to investigate the origin of the z-component.

(*ix*) Current methods of ionospheric predictions were critically examined and improvements suggested.

(*x*) Theoretical studies were made regarding the formation of the E-layer in the oxygen dissociation region of the upper atmosphere.

(*xi*) Ionospheric observations during the solar eclipse of February 25, 1952 showed evidence of possible dips in F_2 ionization .

(*xii*) Investigations revealed some correlations between variations of ionospheric parameters and of pressure at gound level at Calcutta. These have been explained on the basis of atmospheric tides and variations in the solar radiation.

(*xiii*) The possible presence of atomic nitrogen in the upper atmosphere was examined critically.

(2) Investigation on Nuclear Resonance by Radio Method :

Nuclear magnetic resonance signals of protons fron .76N $NiSO_4$ solution were obtained by the Super-regenerative method of detection. Some observations were made on the 'wiggles' phenomenon and its application in the determination of transversal relaxation time of protons in presence of nickel ions.

(3) Ultra-short and Microwave Investigations :

(*i*) Radiation characteristics of a conical helix was studied over the range 100—500 Mc-s. It has been shown that this type of aerial can operate very efficiently over a large bandwidth.

(*ii*) A variable inductance in the form of a conical helix was successfully used to construct an oscillator operating over a band of 5 Mc-s to 450 Mc-s.

(*iii*) The r.f. permeabilities of Ni and Fi were measured at 3 cm. wavelength using a cavity resonator technique.

(*iv*) Radar unit ANPS-10 was set up and regular data were taken to study the correlation of propagation charcteristics of 3 cm. wave with meteorological conditions.

Work was also in progress on the construction of an independent high power radar unit particularly suitable for the above investigations.

(4) Investigations on R.f. Measuring Equipment :

A new type of impadance meter suitable for automatic indication of capacitance and power factor of a two terminal network was designed and constructed.

(5) Investigations on Thermionics and Valves:

(*i*) Theoretical investigations were made of the phenomenon of poisoning of oxide-coated cathode due to absorption of gases. It was shown that poisoning may, under certain conditions, be responsible for the higher emission obtained under pulsed condition of operation.

(*ii*) Unified theories of thermal and shot noses were discussed critically and the space charge reduction of noise explained from a new angle.

(*iii*) The problem of current division in triode was treated from electron optical standpoint and good agreement between theory and experimental results obtained.

(*iv*) Type 80 valves with oxide coated cathode, having satisfactory emission properties, were constructed. 605 triode valves were also constructed and attempts to improve upon its emission characteristics were in progress. A start was made on the re-conditioning of low power transmitting tubes.

(6) Investigations on "Light Effect":

Theory put forward earlier on the discharge mechanism in a ozoniser tube, both in darkness and also when exposed to light, was extended and it was shown that it successfully accounts for both the positive and the negative light effects.

(7) Studies on "Electret":

A technique was developed for making 'Electrets' with paraffin slab; and equipments have been set up for the study of its various properties.

Philology

1. Sukumar Sen, Teacher (*i*) Comparative Grammar of Middle Indo-Aryan, begun in 1947 ended in December 1951, Published by Linguistic Society of India. (It delas with the different Middle Indo-Aryan languages beginning with the dialects of the Asokan Inscriptions (3rd century B. C.) and ending with Avahattha (13th century A. D.). Only phonology and morphology have been treated.)

   (*ii*) Historical Syntax of Middle Indo-Aryan, begun in 1951, likely to be completed by the end of 1953. (The syntax of the different Middle Indo-Aryan dialects is being treated elaborately. It would be a companion volume to 'Comparative Grammar of Middle Indo-Aryan.)

   (*iii*) Etymological Dictionary of Old and Middle Bengali, begun in 1946 likely to be completed by the end of 1956, (Words have been selected not only from the texts that have been printed so far but also from all the important manuscript copies of texts not yet printed nor likely to appear in print in near future. No text dating between 1100 and 1800 A. D. has been omitted. The work, when completed, will also be a comparative the savoury of the Modern Indian Languages early stage).

Arabic and Persian

1. Prof. M.Z. Siddiqi M. A., PhD. (*a*) A critical edition of the treatise on the uses of Astrolate (in Arabic) by al-Barumi together with introduction and index of technical terms., started from last few years, These works will be ready for the press in 3 or 4 months.

   (*b*) Studies in the history of the Hadith Literature in Arabic, started from last few years. These works will be ready for the press in 3 or 4 months.

   (*c*) Library activities of Muslim Women from the 7th to the 17th Century A. D., started from last few years. These works will be ready for the press in 3 or 4 months.

   (*d*) Science of tradition, their origin and development,

2. Prof. M. Z. Siddiqi, M.A., Ph.D., and Md. Akbar, M.A., The edition of the Kitabut Taliqatiwan—Nwadir (an unknown anthrology of old Arabic Poetry), by Abu Ali Harun C. Zakariyya-al-Hajri.

Islamic History and Culture

1. Dr. M. L, Roy Choudhury, Head of the Depart, (*i*) " Gita " translated in Arabic, Published by Thaker Spink and Co., "Gita" in Arabic is the only one of its kind in the world.

   (*ii*) State and Religion in Mughal India (English), Indian Publicity Society, Calcutta, The Culture and religious history of India during that glorious period of Mediaevel Indian History.

   (*iii*) History of India in (Hindi), Das Gupta & Co., Calcutta, A brief history of India in India meant for advanced Student in School and Colleges.

   (*iv*) Indian Administrative (Hindi and Bengali), Thakur Brothers, Barasat, 24 Parganas (Modern Indian Constitution meant for junior Students).

   (*v*) Mughal Religion through Mughal Painting To be published by Indian History Congress in 1953, A bigger edition is being undertaken.
   (*vi*) History of Medieval Bengal and its Culture, To be published bp General Printers and Publishers in Calcutta, 1953-54. (It will fill up a big gap in history of Bengal, the new featue of the book in the emphasis on the cultural history of Bengal.

2. Mohibbul Hasan Khan, Lecturer, (*i*) History of Tipu Sultan, Published in June 1951, (Deals with the condition of India towards the edd of the 18th century in the struggle for power in South India Character, failure, achievements of Tipu ; relations with Nizam, Marathas, English and other foreign powers.

   (*ii*) History of the Sultans of Kashmir 1320—1586 Began in July 1951, likely to be completed in a year and half. This will deal with the political, administrative, social and economic history of Kashmir during the Sultanate period.

(*iii*) Persian Sources for the History of the Sultans of Kashmir, wrote for the History Congress December 1952, summary published.

3. Sukumar Ray, Lecturer, Bairam Khan Khan Khanan, begun in 1947 and completed, to be published by the University of Calcutta, In the press (Historical biorgraphy of Bairam Khan covering the reign of Babur, Humayun and Akbar. Based on orginal Persian sources including many unpublished Mssat various libraries of Europe and India which have not been utilised by any previous writer. It is as well as study of the early years of Akbar's reign.)

Mathematics

1. H. D. Bagchi & N. K. Chakravarty, (*i*) Note on Laguerre polynomial and associated equations functional and differential, Published in Bulletin, Calcutta Mathematical Society.

   (*ii*) Note on a tried of functional equations, connected with a Laguerre polynommial begun in 1950, and completed, Published in Bulletin, Calcutta Mathematical Society.

2. H. D. Bagchi & P. C. Chatterji, Note on a functional equation, connected with the Weierstrassian function begun in 1950 and completed, Published in Bulletin, Calcutta Mathematical Society.

3. H. D. Bagchi & B. Mukherjee, (*i*) Note on a circular cubic with a point of inflexian at infinitiy begun in 1951 and completed, Published in Bulletin, Calcutta Mathematical Society.

   (*ii*) Note on a circular cubic with a coincidence point at infinity begun in 1952 and completed, Published in Bulletin, Calcutta Mathematical Society.

4. H. D. Bagchi, & N. K. Chakravarty, (*i*) Note on certain series and integrals, involving Tschabysheff function begun in 1951 and completed, Publihed in Bulletin, Calcutta Mathematical Society,

   (*ii*) Note on Tschabysheff functions and associated equation (functional and differential) begun in 1951 and completed, Pubished in Journal of the Indian Mathematical Society.

   (*iii*) Some further properties of Tschabysheff functions begun in 1950 and completed, Published in Journal of the Indian Mathematical Society.

5. H.D. Bagchi & P.C. Chatterji Linear difference equations, connected with certain special functions, begun in 1951 and completed, Published in Journal of the Indian Mathematical Society.

6. H. D. Bagchi & B. N. Mukherji, (*i*) " Note on pair of functional equations connected with the function begun in (1951) and completed, Published in Proceedings of the Indian Academy of Science, Bangalore,

(*ii*) Note on the mutual relation between the two kinds of Tschabysheff functions begun in 1951 and completed, published in Proceedings of the Indian Academy of Sciences, Bangalore.

(*iii*) Note on the generalised Lagguerre polynomial and its equations begun in (1951) and completed Published, in Proceedings of the Indian Academy of Sciences Bangalore.

7. H. D. Bagachi, Note on circular cubics and bicircular quartics 2nd paper, begun in 1952 and completed. Published in "Mathematics Student", Bengalore.

(*ii*) Note on the volume of a tetrahadron begun in 1952 and completed. Published in "Mathematics Students", Bengalore.

(*iii*) Note on rational (or Heron) triangles, begun in 1952 and completed. Published in "Mathematics Students", Bengalore.

8. H. D. Bagchi, and P. C. Chatterji, Note on Hermile function and its associated equations (functional and differential) begun in 1950 and completed, Published in Journal of the Asiatic Society of Bengal, Park Street, Calcutta.

9. H. D. Bagchi & B. Mukherji, (*i*) Note on a circular cubic with one or more Sextactic points at infinity, begun in 1951 and completed. Published in Rendiconti di seminario Methamatico University of Padova)—Padova Italy.

(*ii*) Note on the circular cubic and bicircular quartics with four cognate cyclic points, begun in 1951 and completed, Published in Rendiconti di Seminario Mathematico, University of Padova—Padova, Italy.

10. H. D. Bagchi & P. C. Chatterji, (*i*) Note on Weber function and its associated equations (functional and differential) begun in 1952 and completed.

(*ii*) Note on a second functional equation connected with the function begun in 1952 and completed, Published in American Mathematical Monthly.

11. H. D. Bagchi & K. C. Maity, " Statistical Note on certain Algebraic inequalities" begun in 1951, Published in "Mathematics Student" (Bangalore).

12. H. D. Bagchi, Note on comics of double osculation of a cubic, begun in (1948), Submitted in 1948 but actually published in 1952, Published in Proceedings of National Academy of Sciences India (Allahabad)

(*ii*) Note on circular cubic and bicircular quartics—1st paper, begun in 1948 Submitted in 1948 but actually published in 1952, Published in Proceeding of the National Academy of Sciences India (Allahabad).

(*iii*) Note on the Caybyane harmonic polars of a cubic, Accepted for publication in the Proceedings of the National Academy of Sciences, India (Allahabad).

13. H. D. Bagchi & P. C. Chatterji, Note on certain equations connected with Hermite and Webers, functions.

14. H. D. Bagchi & B. N. Mukherji, (*i*) Note on certain equation connected with Gagenbanar functions.

    (*ii*) Note on certain equations, connected with Bateman, functions.

15. H. D. Bagchi & M. C. Chaki, (*i*) Note on certain remarkable types of plane Collinections.

    (*ii*) Note on a third functional equation connected with the function (z) Accepted for publication

16. H. D. Bagchi & B. Mukherji, Note on certain remarkable types of curves, surfaces and hyfer surfaces Accepted for publication in the "Rendiconti di Seminario Mathematico Padova, Italy.

17. H. D. Bagchi & M. C. Chaki Note on antepolar plane cubics Accepted for publication in the Rendicanti di Seminario Mathe. matico Padova, Italy.

18. H. D. Bagchi, Note on an equimomental complex of rigid body, Accepted for publication on Journal of Mathematics and Physics. Combridge Mass U.S.A.

Philosophy

1. Dr. S. K. Nundy, An Enquiry into the nature of Art, for D.Phil., begun in 1948 ended in 1951, Thesis of Plato, Aristotle, Kant, Hagal Croce, Roma in Rolland, Rabindranath, etc.

2. Dr. Kamla Mukherjee, Nature of Self, for D.Phil., begun in 1948, ended in 1951, (Indian and Western Theories—The Self as subject.)

3. Dr. Anil Kumar Roy, Maya in Adavaita Vedanta for D.Litt., begun in 1946 ended in 1951, (For Sankarite Adaitya Theory of Maya).

4. Pritibhusan, Chatterji Philosophy of J. Royce, for D,Phil., begun in 1947 ended in 1953, (Royce's Religion, Logic and Metaphysics.)

5. Jetil Sarkar, Nyaya-Kasumanjali for D.Phil., begun in 1950, likely to be completed in 1954, (A modern rendering of the Central argument.)

6. Kali Krishna Banerjee, Study in Nyaya Logic and Theory of knowledge, for D.Phil., begun in 1951 likely to be completed in 1954, (Problems of object and content.)

7. Ram Ch. Pal, Induction, for D.Phil., begun in 1949 ended in 1952, (A critical study of Induction as Logical process.)

8. Kanailal Poddar, A comparative study of eight commentaries on the first four Brahma Sutras, for D.Phil., begun in 1952 likely to be completed in 1954. (Sankara, Ramanuja, Madhava, Vallabha, Nmiberker, Baladeva, Veskara, Vijnan bhiksu.)

9. Sm. Gouri Das Gupta, Some misinterpretations of Sankarite Advaita, for D.Phil., begun in 1952, likely to be completed in 1955, Radhakrishnan, Kokileswar, Sastri Rudolf otto.

10. Sm. Arati Das, The Ethics of Vagvadgita, for D.Phil., begun in 1952, likely to be completed in 1955, Sankarite and Vaisnavite interpretation.

11. Prof. S. K. Mitra, (*i*) Studies in Sankarite Advaita

(*ii*) Philosophy of Sri Chaitanya, published in the History of Philosophy Government of India.

Sanskrit

1. Dr. Sat Kari Mukerjee, Udayanis Atmatattva Viveka, translated into English, begun in June, 1952, likely to be completed in May, 1953, (On the existence of the supreme soul, from the stand point of Nyaya philosophy about 300 pages).

2. Dr. Amareswar Thakur, Lecturer, Yaska's Nirukta, translated into Bengali, begun in June, 1950, completed in May, 1952, to be published in the Asutosh Sanskrit Series, Calcutta University. (On the Vedic philosophoy about 1500 pages.)

3. Dr. Asutosh Sastri, Lecturer, Vedanta Darsana Advaitavada in Bengali, Vol. III. begun in June, 1950, completed in May, 1952, In course of printing to be published by the Calcutta University, Press, Vols. I & II already published. (On Vedantic non-dualism, about 400 pages.)

4. Pt. Narendra Thakur Lecturer (*i*) Udyani Nyaya-Kusumanjali critically edited with commentations begun in June 1949, completed in May, 1950, In course of printing, to be published in the Asutosh Sanskrit Series, Calcutta University. (On the existence of God, from the stand point of Nyaya philosophy about 500 pages.)

(*ii*) Pratyaksa didhiti, (critically edited with English translation, etc. begun in June 1951 likely to be ended in May 1953. to be published in the Asutosh Sanskrit Series, Calcutta University. (On knowledge and Error, from the stand point of Navya Nyaya about 400 pages.

5. Pt. Amarendra Mohan Tarkatirtha, Lecturer, Madhuraniruddha, (critically edited, begun in 1951, completed in May, 1952, to be published in the Asutosh Sanskrit Series, Calcutta, University,

(On Usa (Madhura) and Aniruddha, a dramatic play, about 200 pages.)

6. Dr. Sitansu Shekhar Bagchi, Lecturer, Tarka on Reasoning from the stand-point of Nyaya philosophy, begun in May, 1944, ended in June, 1945, In course of printing in the Calcutta Oriental Press, Ltd.. (On Indian Logic and Epistemology about 350 pages.)

7. Gauri Nath Bhattacharya, Lecturer, Indian Aesthetics, begun in May, 1949, ended in December, 1951. (On Rhetorics and Aesthetics about 350 pages.)

8. Pt. Pattabhiram Sastri, Lecturer, Parmananda tantra, critically edited with an original commentary begun in May, 1952, likely to be completed in May, 1953. (On Tantricism in all its various department, about 600 pages.)

9. Pt. Bhutanath Saptatirtha, Lecturer, Kuturila Bhatta's Slokavatika translated into Bengali, begun in September 1951, completed in December 1952.

GAUHATI

History

1. Dr. A. R. Baji, Reader (a) A Comparative Study of Colonial Policies in South East Asia, begun in September 1950, likely to be completed in 1954. (being a study in the policies of the U. S. A. in the Philippines, France in Indo-China, Great Britain in Malaya and Holland in Indonesia with particular emphasis on the period after 1875).

   (b) Administration and Social Life under the Western Gangas, begun in January, 1952, likely to be completed in 1954, (being a study of the administrative machinery, social, religious and economic conditions of Ganga rule in Mysore (A. D. 400—1,000).

2. Vibhuti Bhusan Mishra, Lecturer History of the Gurjara-Pratiharas for D.Phil. Degree of the University of Gauhati, begun in 1947, as a Research Fellow in the Banaras Hindu University, ended in 1952, following Research papers virtually constituting the chapters of my thesis have been published in the Journals noted against each of them. (The scope of the thesis covers the genealogical and chronological history of the dynasty along with the administrative, social, religious and cultural history of the land under the regime of the Gurjara-Pratiharas).

   (1) The Gurjara-Pratiharas in Bhrigukaccha —Annals of the Bhandarkar Ori. Res. Institute, Vol. XXXI ;

   (2) The Administrative system of the Pratiharas —Journal of the University of Gauhati, Vol. III ;

   (3) The Gurjara-Pratiharas of Gurjaratra (under publication in the Annals of the Bhandarkar Ori. Res. Institute, vol. XXXII (*vide* letter No. 2922 of 1952-53.)

Economics

1. S. S. Sengupta, Lecturer, Dept. of Commerce, On the theory of self-movement of a competitive enterprise economy organised on the basis of private ownership of property, begun in 1947-48, Partial result have been communicated to the Editor Review of Economic studies, and to Profs. J. R. Hicks, M. H. Dobb, R. F. Harrod, R. Frisch, P. A. Samuelson and Don Patinkin. A moderately full account of the problem and its method of analysis is to come out in the forthcoming number of the Gauhati University Journal. (Internally-generated movements of the economy are traced to the efforts of the entrepreneurs to augment their profits through technical innovations. The central task of analysis is posed as one of determining, qualitatively, the nature of inter-sector relationships and of reaction-patterns such as can ensure a continuous growth (through accumulation) and life of the economy.

Assamese

1. Maheswar Neogi, Lecturer Sankaradeva, his life and times, for D.Phil.,

begun in 1950 ended in early 1953. (Assam's social, religious and political scene before Sankaradeva's (1449—1568 A. D.) Bhakti movement. Sankaradeva's life and literary works. Religious and social reform. Ethics, theology and philosophy Monastery and village temple systems.

Religion

1. Prof. B. Kakati, M.A., Ph.D., Visnuite Myths and Legends, begun in February, 1950 and ended in December, 1952. (Popular myths and legends associated with the various incarnations of Visnu are collected and studied in order to illustrate their pre-Aryan origin.

Linguistics

1. Dr. B. K. Barua, M.A., B.L., Ph.D., Place-names of Assam, begun in June, 1951 likely to be completed in 1954, Read before the all-India Oriental Conference held at Lucknow. (Place-names of Assam reveal traces of earlier races that inhabited the province at different historical periods. A classified list of place-names are compiled in order to study their linguistic, historical and cultural bearings.)

Sanskrit

1. Dr. B. K. Barua, M.A., B.L., Phd., Study in the Kalika Purana, begun in June, 1951 likely to completed in 1954 (*Kalika Purana,* a Sanskrit text written in Assam probably in the 10th century A. D. The book provides information as to the social and religious conditions of Assam of the period. All available materials are systematised in this study.

Folk-lore

1. P. D. Goswami, M.A., Studies in the Folk-lore of Assam, for D.Phil., begun in 1949 ended in 1952. (The author makes a survey of the various types of Folk-literature in Assames. He has analysed the motifs of the Folk-tales of Assam and has shown their counter-parts in Sanskrit and other Indian languages.

Religion and Culture

1. Satyendra Nath Sarma, M.A., Neo-Vaisnavism in Assam with special reference to the Satra Institution, for D.Phil., begun in January, 1951, ended in January 1953. (The background of neo-Vaisnavite movement initiated by Sankaradeva—the nature of neo-Vaisnavite movement—fundamental principles—growth of sub-sects Nature of the Satra institution.)

GUJARAT

L. D. Arts College & M. G. Science Institute, Ahmedabad

Chemistry

1. Bhaskar M. Desai, Studies in Chromones for M.Sc., begun in 1950, ended in 1952.
2. Dolatray N. Desai, Studies in Nepthalene series, for M.Sc., begun in 1950, ended in 1952.
3. Jayantilal I. Desai, Physical properties of Cyclic acids, for M.Sc., begun in 1951, ended in 1953.
4. Navinitrai N. Naik, Investigation and chemical study of Antibiotics from Indian Medicinal plants, for M.Sc., begun in 1951, ended in 1953.
5. Jagdishchandra P. Trivedi, Nitration of Chromones, for M.Sc., begun in 1951, ended in 1953.
6. Jayantilal H. Shah, Study in Hydroxy Quinolins, for M.Sc., begun in 1951, ended in 1953.
7. Chimanlal S. Bhatt, Studies in Colloidal systems, for M.Sc., begun in 1951, ended in 1953.
8. Jayaramdas H. Amin, The frics reactions of Aryl Easters of Sulphonic acids, for Ph.D., begun in 1951 ended in 1953.
9. Shrimati Subhadra N. Mehta, Chemical investigation of Bryophyllum Calycinum sphaerauthum indious Thespesia Populnea and others, for Ph.D., begun in 1951, ended in 1953.
10. Mafatlal J. Patani, Studies in Colloidal Systems, for Ph.D., begun in 1951, ended in 1953.
11. Ramaniklal H. Shah, Synthetic studies in Coumarins, for Ph.D., begun in 1950, ended in 1953.

Zoology

1. Mahadeo S. Dubale, Teacher, The Morphological and Biochemical Aspects of Air Breathing in Fishes with reference to some Indian Forms, for Ph.D., begun in 1950, ended in 1952.

Botany

1. Chandrakumar Kantilal Shah, Embryogeny of Cyperaceae family, for M.Sc., begun in 1951, ended in 1953.
2. Ajitrai K. Mankad, Studies of Embryogen of the plants in Palmae family (Phoenix, Caryota Borassus), for M.Sc., begun in 1951, ended in 1953.

3. Shrimati Oliva J. Fonseca, Contribution to the Embryogeny of plants of Vitaceae and Passifloraceae families, for M.Sc., begun in 1951, ended in 1953.

4. Prasannakumar M. Jani, Teacher, A contribution to the Embryological studies on the family composition, for Ph.D., begun in 1951, ended in 1953.

Gujarat College, Ahmedabad

Chemistry

1. Divyakant H. Mehta, Studies in Courmarins, for M.Sc., begun in 1950, ended in 1952.

2. Kamalakar K. Bokil, Synthetical Anthelmintics (Synthesis of β aryl γ butyro Lactones), for M. Sc., begun in 1950, ended in 1952.

3. Avinash Gajanan Munshi, Derivatives of Acridine and Quinoline—Anti-malerials, for Ph.D., begun in 1950, ended in 1952.

4. Pravinrai D. Jhala, Studies in Chalkones and Coumarins, for M.Sc., begun in 1951, ended in 1953.

5. Maganlal A. Thaker, Enzymetic studies in Starch, for M.Sc., begun in 1950, ended in 1953.

6. Parmanand M. Shah, Studies in Coumarones and Coumarins, for M.Sc., begun in 1951, ended in 1953.

7. Newand B. Mulchandani, Studies in Fries Migration, for M.Sc., begun in 1951, ended in 1953.

8. Navanital C. Parikh, Cinnamic Acid and reactions in Anthelmintics, for M.Sc., begun in 1950, ended in 1953.

9. Manilal T. Shah, Antileprosy drugs for Ph.D., begun in 1950, ended in 1953.

Politics

1. Suresh C. Mashruwala, Evolution of the Social Contract Theory, for M.A., begun in 1950, ended in 1953.

2. Naren J. Thakore, Nationalisation and its success and failure for M.A., begun in 1951 ended in 1953.

3. Mahesh B. Umarvadia, Demócracy in practice in India for Ph.D., begun in 1950, ended in 1953.

4. Devendra H. Sutaria, Owelfare State, for Ph.D., begun in 1951, ended in 1953.

Botany

1. Shrimati Khorshed B. Sutaria, Flora of Mt. Abu, Dangs, North Gujarat, and Cytology of Liliaceae, for M.Sc., begun in 1950, ended in 1953.

2. Mohansinh P. Chauhan, Flora of East Gujarat and Cytology of Araceae, for M.Sc., begun in 1950, ended in 1953.

Physics

1. Naranbhai V. Patel, Optical properties of metals and their films, for M.Sc., begun in 1950, ended in 1953.

2. Naraindas H. Sahijwani, Scattering of light through Fogs and Colloids, for M.Sc., begun in 1950, ended in 1953.

V. P. Mahavidyala, Vallabh Vidyanagar

Chemistry

1. Himmatbhai V. Amin, Study on Fuel woods of Gujarat, for M.Sc., begun in 1950, ended in 1952.

Physical Research Laboratory, Ahmedabad.

Physics

1. Rangnath N. Kulkarni, Determination of the amount and vertical distribution of atmospheric Ozone at Mount Abu using the improved type of Dobson Ultra-violet Spectrophotometer and a discussion of the day-to-day changes of Ozone with weather, for M.Sc., begun in 1950, ended in 1952.

2. Upendra D. Desai, Time Variation of Cosmic Rays Intensity at Ahmedabad, for Ph.D., begun in 1950, ended in 1952.

3. Sureshchandra R. Shah, Atmospheric Turbulence near the ground temperature and wind gradients, for M.Sc., begun in 1950, ended in 1953.

4. Vasudeo C. Upadhyaya, Heat transfer in the lowest lowers of the atmosphere, for M.Sc., begun in 1950, ended in 1953.

5. Ram Gopal Rastogi, Studies of the Ionosphere at Ahmedabad, for Ph.D., begun in 1951, ended in 1953.

L. D. Arts College, Ahmedabad

Philisophy

1. Shrimati Charumati P. Jani, Social Philosophy of Shri Goverdhanram M. Tripathi, for M.A., begun in 1951, ended in 1953.

M. T. B. College, Surat

Chemistry

1. Madanlal C. Sheth, Jatropha Glandulifera Roxb, for M.Sc., begun in 1950, ended in 1953.

Gujarati

1. Shri Kunjvihari, C. Mehta, Arvachin Kavitama Pracrutinu Nirupana, for Ph.D., begun in 1951, ended in 1953.
2. Ishverlal K. Patel, Surat Jillana Dariyakanthana Pradeshama Bolati Gujaratini Vishistatao, for Ph.D., begun in 1951, ended in 1953.
3. Satyadev I. Patel, Natyakar Tarike Ranchhod Bhai Udayaramnu Mulyankan, for Ph.D., begun in 1951, ended in 1953.

M. N. College, Visnagar

Chemistry

1. Ramanlal V. Shah, Reactivity of Methylene (CH_2) Group, for M.Sc., begun in 1951, ended in 1953.

L. D. Eng. College, Ahmedabad

Geology

1. Ramchandra B. Gupta, Teacher, Study of Deccan Traps in Western Ghats, for Ph.D., begun in 1951, ended in 1953.

B. J. Institute of Learning, Ahmedabad

Sanskrit

1. Padmanabh S. Jaini, Teacher, The Early Buddhist Conception of Lokottara Marga and Similar Doctrines of the Jain and Yoga Schools, for Ph.D., begun in 1951, ended in 1953.
2. Dinanath K. Travadi, Development of Champu Literature, for Ph.D., begun in 1950, ended in 1953.

Ancient Indian Culture

1. Jashwantray D. Thaker, Dramatic Theory and practice as revealed in the Natya Shastra of Bharat, as Ph.D., begun in 1950, ended in 1953.
2. Ramanlal K. Dharaiya, Ideas in the Rajya Dharma Parva of the Shanti Parva of Mahabharat, for Ph.D., begun in 1950, ended in 1953.

Gujarati

1. Induprasad J. Bhatt, Premanand—Shamalna, Samayani Locsthiti ane Tenu Premanand ane Shamale Potani Crutioma Karavelu Darsan.

2. Premshanker H. Bhatt, Nhnalal—a study, for Ph.D., begun in 1951, ended in 1953.

S. B. Garda College, Navsari

Philosophy

1. Keshavlal B. Vyas, Absolutism in Modern Western Philosophy and its implications in religion and morality, for Ph.D., begun in 1951, ended in 1953.

2. Chintaman T. Bhopatkar, Psychological contribution of Freud, for Ph.D., begun in 1951, ended in 1953.

3. Purushottam D. Chandratre, Methodology of the major Bhashyas on the Brahma sutras, for Ph.D., begun in 1951, ended in 1953.

4. Gajanan N. Joshi, Evolution of the concepts, of Atman and Moksha in the different systems, of Indian Philosophy, for Ph.D., begun in 1950, ended in 1953.

Samaldas College, Bhavnagar

Sanskrit

1. Vishnuprasad A. Bhatt, Sanskrit, Prakrit and other linguistic evidences of Saurashtra, for Ph.D., begun in 1950, ended in 1953.

2. Shrimati Indukala H. Jhaveri, The Samkhya and the Jain, Theories of Parinama based mainly on Sanskrit Texts, for Ph.D., begun in 1950, ended in 1953.

JAMMU AND KASHMIR

Physics

1. L. F. Curtiss, Prof. P. S. Gill, The Variation of Intensity of Fast Cosmic Ray Neutrons with altitude, begun in 1951, ended in 1951, Published in Physical Review Volume 85, 309 (1952), (Using BF_2 proportional counters, containing boron enriched in B10, imbedded in a paraffin block 15×15×17 inches, as a moderator of fast neutrons, the intensity of such neutrons generated in the atmosphere by cosmic rays has been measured at a number of altitudes between 5000 and 13,000 feet above sea level. These locations were all along the same geomagnetic latitude of 20°32′N in Kashmir. The intensity thus measured was found to increase approximately in an exponential manner with decreasing atomospheric pressure under the conditions of the experiments, in general agreement with observations made by other investigators in the free atmosphere, giving an attention length in the atmosphere of 128 $g\text{-}cm^{2}$'.)

2. Prof. P. S. Gill, Anomalous absorption of cosmic Rays in lead, Under preparation, begun in 1951 ended in 1952.

KARNATAK

Rani Parvati Devi College, Belgaum

Kannada Literature

1. Prof. K. G. Kundangar, Adipuranam of Adi-Pampa Editing, Being published at Chandraprabha Press, Belgaum, begun in 1950, likely to be published in December, 1952, (Life of Adinath, the first Tirthankar and his teaching and practice of Jain religion, his birth and rebirths, his family life and his son's conquest of the world and his final bettitude.

2. Prof. Gaddijimath, Folk songs (Janapada Sahitya in Kannada), for Ph.D., begun in 1950, likely to be completed by the end of March, Historical, Social, religious and literary life of Karnatak in general and those of an agriculturist in particular.)

3. R. S. Panchamukhi, M.A., Director of Kannada Research, During 1950—52 the following books are published by him :

   (1) Karnatak Inscriptions Vol. II.

   (2) Twelve Years of Kannada Research (in Bombay State) (1939—51).

   (3) Gandharvas and Kinnaras in Indian Iconography.

   (4) Kavijihvabandhanam etc.

4. Dr. G. S. Gai, Ph.D., Reader in Dravidian Philology.

   (*i*) A Linguistic study of the works Vaddaradhane and Gadayuddha.

   (*ii*) A study of Sanskrit Loan words in Kannada with special reference to their semantic divergence.

   (*iii*) A dialect study of Kodagu Language.
   Besides this he has published 10 research articles on Linguistics, epigraphy and history.

5. B. S. Kulkarni, M.A., Reader in Kannada Language and Literature:

   (*i*) Study and editing of Samayaparikehe.

   (*ii*) "Kannada Jain Bharatagalu."

6. V. S. D'Souza, M.A., Reader in Sociology :

   (*i*) Conducted a Social Survey of the Navayats of Kanara.

   (*ii*) Partly studied the Konkani Muslims of Ratnagiri and the Moplas of Malabar.

(iii) Collected data about the Muslims, Christians and Brahmans of Dharwar District for the revision of the District Gazetteer.

7. A. M. Annigeri, Research Assistant:

(i) Studied the Manuscript Abaluracharite and Assisted the Director in his work.

Kannada Research Institute, Dharwar

History

1. D. H. Koppar, M.A., *Research Fellow*, Social and Economic life under the Hoysalas, for Ph.D., begun in 1951, to be completed.

Research Students

History

1. S. H. Ritti, B.A., (Hons.), History of the Early Alups, begun in 1950, ended in 1952.

Philology

1. Vasant Kavali, B.A. (Hons.), A Linguistic study of a portion of the Kannada work Vaddaradhane, begun in 1950, ended in 1951.

2. L. B. Patil-Kulkarni, B.A., A Linguistic study of Basavarajadevara Ragale (2nd sthala) begun in 1951, ended in 1952.

Literature

1. C. K. Dixit, B.A., (Hons.), Rhetorics with special ref. to Nagavarma, begun in 1950, ended in 1951.

2. Miss P. G. Sidenur, B.A. (Hons.), Prose Development in Kannada, begun in 1951.

Sociology

1. Mrs. Alice Yesupriya, Social customs and Maternity Welfare, begun in 1950, ended in 1951.

2. N. A. Majumdar, A Socio-economic Survey of the Literatures in the Bharat Mills, Hubli, begun in 1951, ended in 1952.

Ph.D. Students

Literature

1. Prof. H. T. Sasnur, M.A., Kannada Literature of the 11th and 12th Cent. A. D., for Ph.D., begun in 1942, to be completed.

2. N. K. Kulkarni, M.A., B.T., Kumaravyasa—A study, for Ph.D., begun in 1943.

3. S. G. Kadadevarmath, B.A., The Kannada Literature during the period of the Keladi Chiefs, for Ph.D., begun in 1945, ended in 1952.

4. K.V. Huli, A critical study of the Haridassas of Karnatak, for Ph.D., begun in 1946, to be completed.

5. P. K. Naik, M.A., Kalachuryas of Kalyani and their times, for Ph.D., begun in 1948, to be completed.

6. Prof. S. R. Malagi, MA.., B.T., Rudrabhatta's Jagannatha Vijaya—a study, for Ph.D., begun in 1948 and to be completed.

7. Prof. G.D. Nadkarni, M.A., Pampabharata—a study, for Ph.D., begun in 1948.

8. K. M. Krishnarao, M.A., Jagannathadasaru, for Ph.D., begun in 1952.

Philology

1. V. R. Umarji, M.A., B.T., The Influence of Sanskrit and Prakrit Languages on Kannada Language and Literature, for Ph.D., begun in 1944 ended in 1952.

History

1. Prof. R. Y. Dharwadkar, M.A., Chalukyas of Kalyani, for Ph.D., begun in 1945.

2. R. V. Kulkarni, M.A., Vikramaditya VI, for Ph.D., begun in 1946, to be completed.

3. V. R. Koppal, M.A., B.T., Women Vachana Writers in Kannada Literarture—their life and works, for Ph.D., begun in 1947.

Economics

1. Dr. B.R. Dhekney, Lecturer, Human Fertility survey of Dharwar towns, begun in 1950, completed in 1952. (An inquiry into Human Fertility conducted at Dharwar during 1949-50. The Government of Bombay had made a grant of Rs. 1,500 to meet the expenses of the investigations.)

Finance in the Five Year Plan, begun in 1951 and ended in 1951, Published and read at the Indian Economic Conference at Patna in December, 1951. (A research paper on "Finance in the Five-Year Plan" read at the Indian Economic Conference at Patna in 1951.)

Survey of Housing conditions in Hubli, begun in 1952, ended in 1953.

Botany

1. N. D. Kamat, Studies on the Cyanophyceace of the Karnatak, for M.Sc., begun in August, 1951 ended in 1952. (Over 300 species of the Cyanophyceace have been collected and indentified. The life histories of six species of the following general are being studied (nostoc,

Aulosira, pluto, Aphanothece, Anabaena and Tolypothri Reference to : spore formation and germination.)

2. G. R. Sonnad, Studies on the Chlorococcales and Oedogoniales of Karnatak, for M.Sc.; begun in August 1951 ended in 1953. (Over 90 species of the Oedogoniales and an equal number of the members of the Chlorococcales have been identified. The life history of a new species of Protosiphon has been studied also life histories of a few other species.)

3. S. R. Panchagavi, Demonstrator, Studies on the Lichens of Karnatak, for Ph.D., begun in August 1952 ended in 1944-45. (The work is divided into three parts :
   (1) Systematic survey of the Lichens of Karnatak.
   (2) Ecological studies on some species.
   (3) The chemistry of the commoner species.)

4. S. G. Bharati, Demonstrator, Studies on the Desmids of Bombay Karnatak, for M.Sc., begun in November, 1948, ended in March, 1952. (270 species of desmids have been identified including a number of new species, varieties and forms. The life history of a new desmid genus has been studied. Reproduction is four desmids have been studied.)

Effect of chemical agents on the growth and reproduction, for Ph.D., begun in September, 1952, likely to be completed in 1954-55 (Preliminary work such as isolation of algae in pure cultures has been done. It is intended to find out whether certain chemical agents induce or co-ordinate the processes of growth and sexual union.)

5. H. R. Ladwa, Asstt. Lecturer, Autecology of some common weeds of Dharwar, for Ph.D., begun in October 1951, likely to be completed in 1953-54. (A few weeds have been selected for a detailed ecological study. These include morphological, phenological and anatomical studies. The influence of the climatic, edaphic and other factors on these forms will be studied later.)

6. S. M. Jorapur, Cytology and embryology of Combretaceae, for M.Sc., begun in August, 1950, likely be to completed in August, 1953, (Local species of the combretaceae are being studied from cytological and embryological point of view. The investigation deals with the study of sporogenesis, game to genesis and embryogeny.)

7. Miss T. C. Thankamma, Effects of treatments on plant metabolism with 2—4 and other physiologically active substances, for M.Sc., begun in August, 1951, likely to be completed in January, 1954. (Seeds are pretreated or plant sprayed with solutions of 2—4 and related compounds, carbohydrate, mineral and Vitamin C content are being studied, work is in progress on representative species from among pulses, grasses and dicotyledonous weeds.)

Zoology

1. K. R. Karandikar, Prof. of Zoology, (with V. C. Palekar). Studies on the ovaries of Polynemus tera dactylus shaw in relation to its spawing

habits, Published in the Bombay University Journal, Vol. XIX, Pt. 3, November 1950.

2. Dr. K. R. Karandikar, Prof. (with D. M. Munshi), Life History and Binomics of the cat flea, Ctenoceph alides felis, Bouche, Published in the Bombay at Hist. Soc. Vol. 49, No. 2, August 1950.

3. Dr. K. R. Karandikar, Prof. (with S. S. Thakur), Estimation of fat, oil, Thiamin and nicotinic acid in Sciaenoides brunneus, Day, Published in the Bombay University Journal Vol. XIX, Pt. 5, March 1951.

4. Dr. K. R. Karandikar, (with N. N. Murti), Marine Gastropoda of Bombay, Part I, Published in the Bombay University Journal Vol. XX, Pt. 3, November 1951.

5. Dr. K. R. Karandikar, (with V. C. Palekar), Maturity and spawing period of Thrissocles purava, Ham, as determined by ovadiameter measurements, Published in Proc. Ind. Acad. Sc. Vol. XXXV, No. 4, April 1952.

6. Dr. K. R. Karandikar, (with V. C. Palekar), The overies of Bombay Duck (Harpodon Nehereus) and their relation to its spawing habits in Bombay waters, Published in the Bombay University Journal, Vol. XX, Pt. 5, March, 1952.

7. S. S. Thakur, Morphology, anatomy and histology of Sciaenoides brunneus, Day, for Ph.D., begun in 1948, ended in 1950. (Under the guidance of Dr. K. R. Karandikar.)

8. V. B. Masurekar, Comparative anatomy of the Weberian ossicles and the air bladder in siluridae of Bombay, for M.Sc., begun in 1949, ended in 1952. (Under the guidance of Dr. K. R. Karandikar, degree conferred in January 1952, (Bombay University).

9. M. Vithal, Hypermasiginids of the termites, of Dharwar, for M.Sc., begun in 1949, ended in 1952. (Under the guidance of Dr. K. R. Karandikar, Thesis ready for submission to the Karnatak University.)

10. S. S. Rodgi, Studies on the Gregarines of Millipedes from Dharwar, for M.Sc., begun in 1950. (Work in progress under the guidance of Dr. Karandikar.)

11. J. C. Uttangi, Demonstrator, Studies on the intestinal Portozoa of some insects and amphibians from Karnatak, for Ph.D., begun in 1951. (Work in progress under the guidance of Dr. Karandikar.)

12. A. M. Patil, Asstt. Lecturer Bionomics of the Marine fauna of the Karwar coast, for Ph.D., begun in 1951. (Work in progress under the guidance of Dr. Karandikar.)

13. H. V. Kashyap, Asstt. Lecturer Comparative studies on the heart of Reptiles, for Ph.D., begun in 1951. (Work in progress under the guidance of Dr. Karandikar.)

(*ii*) The structure of the heart of Typhlops (Ophidia), Published in J. Zool. Soc., India, Vol. 2, No. 1, 1950.

(*iii*) The structure and function of the calciferous glands in Hoplochaetella suctoria (Annelida), Published in J. Zool. Sc. Bengal, Vol. 5, No. 2, 1952. (with M. R. Ranade).

(*iv*) The structure of the heart of Riopa guentheri (lacertilia), Published in J. Zool. Soc. India Vol. 3, No. 1, 1951.

14. A. M. Patil, Asstt. Lecturer, Study of the Marine Fauna of the Karwar coast and Neighbouring islands, Published in Part I, Journ. Nat. Hist. Soc. Bombay, Vol. 50, No. 1, August 1951.

(*ii*) Study of the Marine Fauna of the Karwar coast and Neighbouring islands, Published in Part II Journ. Nat. Hist. Soc. Bombay, Vol. 50, No. 3, April, 1952.

15. J. C. Uttangi, (*i*) On a new ciliate Nyctotherus Kalii n.sp. found in the tadpoles of Rana curtipes, Jrd., Published in Curr. Sc. Sept. 1950.

(*ii*) On a new species of Nyctotherus found in Uperoden systoma, Schnd. Published in Curr. Sc. August 1951.

(*iii*) On some ciliate parasite of frogs and toads of Karnatak, Published in Rec. Ind. Mus. Vol. XLIX, Pt. 2, June, 1951.

Organic Chemistry

1. R. M. Dixit, Demonstrator and M.Sc. Student, Synthesis of β-Naphtha Chromones and β-Naphtha Chromone—Acetic Acid, for M.Sc., completed in June, 1952. A paper sent to Science Congress 1953.

2. B. R. Ravikiran, M.Sc. Glutarodilactoms from Cresols, for M.Sc., completed in June, 1953. A paper sent to Science Congress 1953.

3. P. G. Narlekar, Diphenyl Ethyl-amines, for Ph.D., begun in July, 1951, ended in June, 1952.

4. R. B. Kanti, Demonstrator and M.Sc. Student (*i*) Chalcones from Pchloro Acetophenones, for M.Sc., begun in March, 1951, ended in July, 1952. Three papers bearing on this, sent to Science Congress 1953.

(*ii*) Dibromo Acetophenones and Chalcones from them.

5. V. N. Deshpande, Demonstrator and Student Substituted Diphenyl Ethyl-amines, for Ph.D., begun in June, 1951.

6. N. V. Korlahalli, Ph.D., Chloromycet-in Analogues, for Ph.D., begun in June, 1951.

7. R. C. Badami, Asstt. Lecturer Dihydroxy Phenyl Butanes, for Ph.D., begun in July, 1952.

8. M. M. Deshpande, Demonstrator and M.Sc., Student Chlorophenyl Ethyl amines, for M.Sc., begun in June, 1951, ended in March, 1953. 1 paper sent to Science Congress 1953.

9. P. B. Sattur, begun in June, 1951, ended in March, 1953. Dichlorophenyl Ethyl amines, for M.Sc., 3 papers sent to Science Congress 1953.

10. S. N. Kulkarni, Methoxy Methyl Phenyl-amines, for M.Sc., begun in June, 1951, ended in March 1953, 2 papers sent to Science Congress 1953.

11. S. B. Patil, chloronaethoxy Phenyl Ethyl-amines, for M.Sc., begun in June, 1951, ended in March, 1953. 1 paper sent to Science Congress 1953.

12. S. K. Baligidad, Friedel and Crafts Reactions, for M.Sc., begun in June, 1952, likely to be completed in June, 1954.

13. G. B. Maddi, Demonstrator and M.Sc., Student, Reaction Leukart on Aromatic Aldehydes, for M.Sc., begun in June, 1952, likely to be completed in 1954, 1 paper sent to Science Congress 1953.

Inorganic Chemistry

1. R.V. Dani, Demonstrator and M.Sc. Student, Thermal decomposition of Cadimum Nitrate complex formation—Cd (No. 2) 2 and Lithium, Sodium and Potassium, Nitrates, for M.Sc.,, begun in June, 1950, ended in June, 1952. Three papers are sent to Science Congress 1953.

Kannada

1. K. Ishwaran, The problem of Harihar's authorship, for Ph.D., begun in 1950, ended in May, 1953.

Basaveswhar College, Bagelkot

Sanskrit

1. C. N. Deshpande, M.A., Lecturer, Interpretation of the III Mandala of Rigveda, for Ph.D., begun in December, 1951 likely to be completed in December 1953.

Indian Culture

1. L.G. Hiremath, M.A., Professor, Investigation into the Cultural aspects of Veerashaivism for Ph.D., begun in 1950 September, ended in June, 1953.

Linguistics

1. R. C. Hiremath, M.A., Reader in Kannada Language and Literature, Karnatak University, Dharwar, Linguistic Investigation of some Problems on Mutual relationship of Indo Aryan (Sanskrit) and Dravidian (Kannada) Languages, for Ph.D., begun in September, 1950 ended in June, 1953.

MADRAS

Economics

1. Dr. R. Balakrishna, Professor, (*i*) Restoration of Economic Stability (Mysore University Endowment Lecture), begun in August, 1949, ended in 1950. Mysore University—Booklet.

(*ii*) International Economic Relations (Bengali Lectures, Patna University), begun in September 1951, ended in January, 1952, to be published as a book by Patna University, (The author traces the evolution of international economic relations commencing from the Mercantalist period of 16th century. The Mercantalist thought and action in the international sphere have been examined in order to provide the background for the appreciation of the later developments in the 19th century.)

(*iii*) Productivity Measurements in Indian Industry, begun in March, 1951. (This work on Productivity Measurements has been undertaken to measure, if possible, the differences in productive efficiency in the different regions where industries are engaged and also to measure the overall efficiency of an industry over a given period.

(*iv*) Limitations of Full Employment in India, 30th September 1950, begun in July, 1950. Published in Commerce.

(*v*) Tax Incentives in India, begun in July-August, 1950, published in Indian Economic Journal, Conference No. 1950.

(*vi*) The Dollar Problem,begun in August-September, 1950, Published in J. K. Review, Kanpur.

(*vii*) Landmarks in India's Tariff Policy, begun in October 1950, Published in 'Commerce'—Annual Review Issue, January 1951.

(*viii*) Tasks of the Finance Commission, begun in February, 1951, Published in Indian Finance Annual No. 1951.

(*ix*) Tariff Policy in India (3 lectures at Annamalai University), begun in October, 1950 ended in February 1951, to be published in Madras University Journal.

2. Dr. R. N. Poduval, Reader, (*i*) Recent Trends in India's Foreign Trade book, begun in October 1949, ended in June, 1950, Published in Premier Pub. Co., Delhi, (The book deals with the changing pattern of India's Foreign Trade in the post-war period. The pattern of commodity imports and exports, its currency-wise distribution and the commodity terms of trade have been analysed. The settlement of the commodity balance of trade and the circumstances leading to and effects of the devaluation of the Indian Rupee have been examined.)

(*ii*) Finance of the Government of India since 1935 book, begun in January, 1948 ended in 1951, published by Chand & Co., Delhi. (The Finances of the Government of India between 1935—1950 from the main theme of the book. The effect of the war on Central finances has been exhaustively examined by reference to the volume of Government outlays, the level of taxation and the growth of public debt.)

(*iii*) Indian Economy since the attainment of Independence, begun in July, 1950 published in Deccan Herald-Independence No.

(*iv*) India's Foreign Trade since Devaluation, begun in July-August, 1950 published by Indian Finance, 19th August 1950.

(*v*) Incentives for Capital Formation in India, begun in August-September, 1950 published in Indian Economic Journal Conf. No.

(*vi*) Interest Rate Policy in India since the War, begun in September, 1950, published in Indian Commerce Conf. No.

(*vii*) National Income Studies- Recent Developments, ended in October-November, 1950 published in Hindu, 11th November 1950.

(*viii*) Federal Grants-in-aid with special reference to India, begun in October 1950 published in Madras, University Journal.

(*ix*) India's Export Trade in Agricultural Commodities, begun in September 1951 published in Agri. Econ. Soc. Conf. No. 51.

(*x*) India and the Problem of Dollar Exchange, ended in October 1951 published in Indian Commerce Journal Conf. No.

(*xi*) Recent Trends in Federal Finance Lectures delivered at the Annamalai University, begun in December, 1951 ended in February, 1952 published in Annamalai Univ. Journal.

3. C. W. B. Zacharias, Reader, Madras (*i*) Agriculture book, begun in January, 1946, ended in 1950, Published by Madras University, (A detailed analysis of the present position of Madras Agriculture in all its aspects, physical, material, human and institutional with a view to providing the economic background for a planned development of agriculture.

(*ii*) Agricultural Planning in Madras book — a continuations of 'Madras Agriculture' begun in 1946 and in progress. (A study of the principles and objectives which should govern planning and an attempt to depict in some detail the principal features of a planned development of Madras Agriculture.

(*iii*) Incentives for saving and Investment under Inflation begun in September 1950 published in Indian Economic Journal Conf. No. 50.

(*iv*) The Evolution of Economic Thought to be ended in September 1950. Tamil Encycloapaedia to be published.

(*v*) Fixation of Agricultural Prices in Theory and Practice, begun in October, 1950 published in Agri, Econ. Conf. No. 50.

(*vi*) A note on the Rural Banking Enquiry Committee Report, begun in March, 1951. Indian Co-operative Review, January-March 1951.

(*vii*) The Role of Fiscal and Financial Measures in Planning, begun in September, 1951, published in Indian Economic Journal Conf. No. 51.

(*viii*) India's Post-War Export Trade in Agricultural Commodities, begun in September 1951. Agricultural Econ. Conference, 1951.

4. N. C. Bhogendranath, Textile Industry in Madras, for Ph.D., begun in August, 1948, ended in August, 1951. (An historical review of development and critical analysis of organisation, production and management.)

5. Miss T. Minakshi, Research Student, Finances of the Madras, Government since 1919, for M.Litt., begun in August, 1948, ended in August, 1950. (Beginning with an account of the position during the pre-Reform period, a detailed analysis of developments during the Reforms period and their repercussions on the various States is made. Then the evolution of the finances of Madras during the War and post-war periods is traced.

6. Bazaleel Gnanados Research Student, Housing of Industrial Labour in Madras, for M.Litt., begun in August, 1948, ended in August, 1950. (May be divided into 3 sections. The first is theoretical treatment of the problem of housing. The second is a presentation of results of personal investigation revealing the overcrowding owing to lack of a plan for housing labour. The third attempts a synthesis of deductive inference and inductive inquiry to find out how best to tackle the problems.)

7. Miss I. Indira, Research Student, Population and Agricultural Production in Madras since 1930, for M.Litt., begun in August, 1948, ended in August, 1950. (The thesis analyses the trend of population growth in Madras since 1930 against a background of theory and data. The growth in agricultural production during the same period has been examined by taking into account the output of food and commercial crops. An attempt has been made to assess the extent of agricultural over-population in the State.

8. Gee Verghese, Keynes and Trade Cycle for M.Litt., begun in July, 1948, ended in July 1950. (An assessment of the contribution made by J. M. Keynes to Trade Cycle Theory.)

9. V. Shiv Chandra, Sales Tax in Madras, for M.Litt., begun in September, 1948, ended in January, 1951. (In this thesis an attempt is made

to examine the place of Sales Tax in the tax structure of a country. At the outset its early history has been traced and its subsequent revival in European countries has been accounted for. The author has then taken up for examination the causes for its recent popularity in India and its essential features in different parts of the country.)

10. K. Madhava Warrier, Research Student, Indirect Taxation in India, for M.Litt., begun in September 1948, ended in 1951. (An historical and critical review of the past and present role of indirect taxation in the Indian tax system with glimpses of its probable role in the future.)

11. S. C. Joseph, Research Student, Profit sharing in Industry with special reference to Madras, for M.Litt., begun in September 1949, ended in August, 1951. The facts and figures relating to Profit-sharing as a method of diverting industrial profits to labour have been marshalled and the rival positions juxtaposed. The Indian standpoint has been examined and suggestions for assessing the position made.

12. K. Madusudana Perumal Pillai, Research Student, Inflation in Indian Economy, for M.Litt., begun in August, 1949, ended in August 1951. (The Impact of inflation on an undeveloped economy like India is the central theme. A comparison is made with the U. K., U. S. A., Canada and Russia. The steps necessary to reduce the inflationary pressure in the economy have also been pointed out.)

13. Miss M. Gajalakshmi, Research Student, (Industrial Development of Madras State, for M.Litt., begun in August, 1949, ended in January, 1952. (The thesis combines the factual study and interpretation in terms of modern theories of industrial organization. All aspects of industrial development in Madras has been historically traced and assessed in terms of the rate and nature of industrial progress in other provinces of India.)

14. Miss N. Neelambal, Research Student, (Rural Debt and Rural Finance in Madras Province, for M.Litt., begun in 1949, ended in August, 1951. (The magnitude of rural indebtedness in Madras State and the causes responsible for the growth of indebtedness have been examined. The adequacy of rural credit provided by the various credit agencies has been studied.)

15. Mrs. S. Soundaram, Operations of the Reserve Bank of India, for M.Litt., begun in August, 1949, In progress.

16. K. Mohanrangam, Trends of Agricultural Prices in India since 1931, for M.Litt., begun in August, 1949, In progress.

17. V. Shanmughasundaram, Recent Trends in Federal Finance, for M.Litt., begun in August, 1949, In progress.

18. G. Sethuraman, Working of Land-Mortgage Banks in Madras, for M.Litt., begun in August 1950, In progress.

19. Mrs. K. Alamelu, Capital Market in India, begun in August, for M.Litt., begun in 1950, In progress.

20. Miss V. K. Savithri, Tariff Policy in India since 1921, for M.Litt., begun in August, 1950, In progress.

21. D. Arunachalam, Land Utilisation in Madras State, for M.Litt., begun in August, 1950, In progress.

22. K. N. Balakrishnan Nayar, Exchange Control with special reference to India, for M.Litt., begun in August, 1950, In progress.

23. Miss A. Vishalakshi, Economic Planning in India, for M.Litt., begun in August, 1950, In progress.

24. Madr Datta Varma, Industrial Disputes in Madras since 1940, for M.Litt., begun in August, 1950, In progress.

25. B. Krishna Rao Patnaik, Indian Public Debt since 1919, for M.Litt., begun in July, 1951, In progress.

26. M. Radhakrishna Mallya, Public Expenditure in India since 1930, for M.Litt., begun in July, 1951, In progress.

27. K. Krishnamurthi, The Interaction of Government Finances on the Money and Capital Markets in India, for Ph.D., begun in August, 1951, In progress.

28. Miss N. Nagalakshmi, Production and Marketing of the principal commercial crops in India, for M.Litt., begun in August, 1951, In progress.

29. M. Rangaswami, Labour in Organised industries in Madras, for M.Litt., begun in August, 1951, In progress.

30. Miss K.S. Kalyani, Economic Controls in India, for M.Litt., begun in Augst, 1951, In progress.

31. R. Ravi Varma, Consumers' Co-operation in Madras State, for M.Litt., begun in August, 1951, In progress.

32. Miss K. Malathi, Foreign Trade of India since 1939, for M.Litt., begun in August, 1951, In progress.

33. T. P. Subramanian, Industrial Finance in India, for M.Litt., begun in August, 1951, In progress.

History

1. V. R. Ramachandra Dikshikar, Professor (*i*) Purana Index, Published by the University of Madras, (*i*) Is an index of five Purana, *viz*., Vishnu, Vayu, Matsya, Bhagavata, and Brahmanda. Planned in 3 Vol. Vols. I & II Published, Vol. III will be published in 1953.

(*ii*) Pre-historic South India, Published by the University of Madras, Sir William Mayer, Lecturers of the Madras University 1950-51. Deals with Geography and History, Paraeolithic, Neolithic, and the age of meta's Ethonology and South Indian linguistics.

(*iii*) Gupta Polity, Published by the University of Madras, Gupta Polity Deals with the administrative system and organisation under the Imperial Gupta).

2. Dr. T. V. Mahalingam, Reader (*i*) Economic Life in Vijayanagar, empire, Published by the University of Madras, Is a Study of Economic Conditions in the Vijayanagar empire. 1336—1672.

(*ii*) The Bawas in South Indian History, Published by the Journal of Indian History, Trivandrum A monograph as the fortunes of a dynasty of rulers, who played a conspicuous part in South Indian History from the 4th to 16th century.

(*iii*) Polity in the South India and the Deccan, A historical survey of political institutions and the machinery of Government in South India and the Deccan from the earliest times to 1600.

Philosophy

1. Dr. T.M.P. Mahadevan, M.A., Ph.D., Head of the (*i*) Dept. Gaudapada —a study in Early Advaita begun in 1951, Published by the University of Madras Gaudapada and his karika—The Upanisadic basis of the Gaudapada-karika Reason and Revelation—Triple stream of experience—Non-duality—Non-originsation—The world and the individual—The way and the goal—Gaudapada and Buddhism—An estimate.

(*ii*) A Study of Sureswara begun in 1951 and in Progress.

(*iii*) Gandhism, Its philosophy and technique, begun in 1950, Published by The University of Chicago press, U. S. A.

(*iv*) Rudra-Siva, begun in 1950. Prof. C. S. Srinivasachari, Presentation Volume.

(*v*) Myth and Ritual in Hinduism, begun in 1950, Published in Congress of the History of Religion, Amsterdam, Holland.

(*vi*) Beyond Ethics, begun in 1950, Published in Indian Philosophical Congress.

(*vii*) Saundarananda, begun in 1951, Published in Prabhuddha Bharata.

(*viii*) The Philosophy of Vaisesika, begun in 1951. Published in Tamil Encyclopaedia.

(*ix*) The Spirit of Indian Philosophy, begun in 1952, Published by Osmania University.

(*x*) History of Saivism begun in 1952, Published in History and Culture of the Indian People, V. II.

(*xi*) Death and Deathlessness, begun in 1952 published in Prabudha Bharata.

(*xii*) Basis of Ethical, Social and Spiritual Values in Indian Philosophy, begun in 1952 published in Philosophy East and West University of Hawaii. Philosophy in America.

2. Mrs. P.V. Sulochana, M.A., Research Student, Concent of values in Indian Philosophy—For M.Litt. Degree Submitted.

3. K. Raghunayakulu, M.A., Research Student, A study of logical positivism, Registered for M.Litt., Degree.

4. G. Harihara Sastri, Sanskrit Scholar and Research Assistant, Word index to Sankara's Sutra Bhashya, begun in 1951.

Anthropology

1. Dr. U. R. Ehrenfels, Ph.D., Lecturer (*i*) In Bilateral Organization, etc., begun in 1950 published in Journal Anthr. Soc., Bombay, (Comparative study of culture-history, present functioning and development—trends in matrilineal societies of India, including material, —social,—and religious cultures.

Tensions between matrilineal and patrilineal systems are co-ordinated to positions of women, group tensions and kindred problems.

(*ii*) A Kadan Creation Myth, begun in 1950, Published in Journal. " Anthropos " Posieux-Froideville, Switzerland.

(*iii*) Position of Womanhood in Islam, begun in 1950, Published in " Islamic Review " ; Woking, England.

(*iv*) Rich and Poor in Indian Womandhood, begun in 1950, Published in "Women's Welfare's Journ." Government of Madras.

(*v*) Khasi-South India, (*a*) series of 5 articles (illustr.), begun in 1950, Published in " The Hindu".

(*vi*) The Double Sex character of the Khasi Great Deity, begun in 1950, Published in Journal of the Madras University.

(*vii*) Women's Work, begun in 1951, Published in Journal, Women's Welfare, Government of Madras.

(*viii*) Ambivalent Attitudes to Womanhood in Islamic Society, begun in 1951, Published in " Islamic Culture," Hyderabad-Deccan.

(*ix*) Two Forms of Religious Toleration begun in 1951, Published in " Islamic Literature," Karachi.

(*x*) South Indian Culture History, begun in 1952, Published in Journal, Annamalai University.

(*xi*) Prevention of Cruelty to Babies, begun in 1952, Published in Women's Welfare Journal, Government of Madras.

(*xii*) Matrilineal Civilization in India—a series of 4 articles, illustr., begun in 1952, Published in "The Hindu," Madras.

(*xiii*) The Mother-Goddess (in collaboration with Mr. M. S. Gopalakrishnan), begun in 1952, Published in " Triveni," Masulipatam.

(*xiv*) Kadar of Cochin, book begun in 1952, Published by the Madras University.

(*xv*) The Matrilineal Family Background in South India, Published in Madras University Journal.

(*xvi*) Kinship Terms among 4 Khasi Groups, Published in "Anthropos."

(*xvii*) Preliminary Results, etc., Published in Gaughati University Journal.

(*xviii*) Is war a General Human Character traint, In preparation.

2. M. S. Gopalakrishnan, Research Student, Mother Goddess Worship, a regional study (Madras and Malabar), for M.Litt.

Law

International Relations

1. Prof. C. Alexandrowicz, (*i*) International Economic organisations, begun in 1950, ended 1952, Published by Stevens & Sons, London, (Development of International Econ. organizations (public and private) in the last 100 years.)

(*ii*) Vertical and Horizontal Divisions of the International Society, begun in 1952, ended in 1952. (A discussion of vertical barriers and horizontal relations in the international sphere— The WHO, ICA, ILO, UPU, etc., discussed.)

International Law

1. Prof. C. Alexandrowicz, (*i*) Foreign Investment Laws in Asia, begun in 1951, ended in 1951, Published in International Law, Quarterly London January 1952. (A discussion of foreign Investment laws in India, Burma, Ceylon, Pakistan, Japan, Philiphines, etc.)

(*ii*) International Law in India, begun in 1951, ended in 1952, Published in London, July 1952. (A discussion of the Interrelationship between International and Municipal Law in India).

(*iii*) Recognition of States and Governments, begun in 1952, ended in 1952, Published in American Journal of International law. (A discussion of the Quasi-Judicial functions of States and Governments.)

2. Nawaz and Kasava Rao, International law and the jurisdiction of Indian Courts, begun in 1952, ended in 1952. (Deviations of Indian Law from International Law (if any discussed.)

Constitutional Law

1. Prof. C. Alexandrowicz, Supreme Court of India as a Habeus Corpus. (*i*) Bench, begun in 1951, ended in 1952. Published in Madras University Journal, January 1952. (The case of A. K. Gopalan *versus* State discussed.)

(*ii*) American Influence in Indian Constitution making, begun in 1952, ended in 1952, Published in Madras University Journal. (A discussion of views expressed in the Indian Constituent Assembly.)

2. Collective Research Work of 8 M. L. Students, Personal liberty and preventive detention in India, begun in 1951, ended in 1952. A discussion of Supreme Court cases on preventive detention and Habeus Corpus.)

3. Rama Rao and Somasekara Rao, M. L. Students, Prerogative writs in India, begun in 1951, ended in 1952. (Prerogative writs in U. S. A., U. K., and India compared.)

4. Choudary, Research Student, Federaism in India, begun in 1951, ended in 1952. (The Federal structure of India, U.S.A., Cannada and Australia compared.)

5. Srinivasa Murthy, Research Student, Delegation of Legislative power, begun in 1951, ended in 1952. (A discussion of the opinion of the Supreme Court of India and of the differences between the British and American views.)

Mathematics

1. Dr. R. Vaidyanathaswamy, Professor. Book on "Higher Arithmetic" with M. S. Srinivasan, begun in 1950, likely to be completed in 1953. (Background in Modern Algebra ; study of continued fraction and general binary scale representations, and inter-relation between these ; recurring decimals, p-adic numbers, etc.)

2. Dr. M. Venkataraman, Senior Lecturer, (*i*) Finite dimensional vector spaces, begun in 1950, ended in 1952. (The only finite dimensional real or complex Hawdorff vector spaces are Euclidean or Unitary.)

(*ii*) Maps between topological spaces.

(A family of maps is a total family if and only if it is closed for forming continuance functions.)

3. M. S. Srinivasan, Research Student, (*i*) Book with Prof. Vaidyanathaswamy, begun in 1950, likely to be completed in 1953, Published in Proc. Ind. Ac. Sciences 1952. See report under Prof. Vaidyanathaswamy.)

   (*ii*) Shortest semi-regular continued functions.

4. M. V. Subha Rao, Research Student, (*i*) Congruance properties of (n), begun in 1950, ended in 1951. Published in Jour. of Mdras University, 1951. The van Sternek and Ramanujam functions compared ; normability of limits of normed spaces : example from space of intergal functions.)

   (*ii*) Characterisation of inner product spaces.

   (*iii*) Lattice product of topoligies.

5. Miss N. Padma, Research Student, Tensor Calculus and Region Complexes, for Ph.D., begun in 1946, ended in 1952. Curl and divergence of linear tensors and tensor densities ; duality between them ; representation as region complexes in higher dimensions ; apolarity of complexes or linear tensors. Applications to Pfaff's problem.)

6. S. Sankaran, Research Student, Differential operators in Hilbert Space, for Ph.D., begun in 1950, ended in 1953. (Positive definite transformations ; the generalised Cayley transform. Possible characterisation of self-adjoint differential operations.)

7. Miss K. Padmavally, Research Student, (*i*) Characterisation of minimal bicompact spaces, for Ph.D., begun in 1950, ended in 1951. (Generalisations of the Cantor Bendixon theorem to regular and general spaces. Properties of iterated P-derivatives and P-coherences.)

   (*ii*) Contributions to localisation theory.

   (*iii*) Cantor's theory of derivatives.

8. Miss P. Indira Kutty, Research Student, Uniform Spaces, for M.Sc., begun in 1950, ended in 1952. (Uniformities on a completely regular space defined by various families of real continuous functions ; study of special examples.)

Geography

1. Dr. V.L.S. Prakasa Rao, M. A., D.Phil., (*i*) Land use problems and patterns in lower Godavari Area, for D.Phil., begun in 1942, ended in 1946. (Physical Back ground, relief, climate, soils and vegetation, General Land Use, Forests, cultivable and cultivated land, Agriculture, Agricultural regions, Pressure of population on Agricultural land, The Sample Belt, The Type Villages, Conclusion and Summary.)

(*ii*) West Bengal and its people, Special Publication of the City College, Calcutta, begun in 1951. Location, size and space relations, Physical Back-ground-relief, rivers, climate and soil, Irrigation and Multi purpose projects, Resources—Agricultural, Mineral, Animal, Forests and Fisheries, Population-Growth and Distribution, Transport, Land Productivity, Calcutta—Site and Accessibility, Morphology and Functional Regions.)

Botany

1. E. John Chinnayya, Soil conditions and wilt diseases in plants with special reference to *Rhizoctonia* spp. on Cotton, for Ph.D., begun in August 1948, ended in August 1951.

2. Miss K. Radha, Soil conditions and wilt diseases of plants with special reference to *Rhizoctonia bataticola*, for Ph.D., begun in July 1947 ended in January 1952.

3. R. Prasanna Varma, Soil conditions and wilt diseases in plants with special reference to *Fusarium* spp., on tomato, for Ph.D., begun in August 1948 ended in January 1952.

4. K. T. Mathew, Studies on the Black rot of Coffee, for Ph.D., begun in August 1949 ended in August 1952.

5. R. Muthukrishnan, Saprophytic activity of Fusaria, in wilt-sick soils, for M.Sc., begun in August 1949 ended in August 1952.

6. C. S. Venkatram, Fusaria of South Indian Soils, for Ph.D., begun in January 1950 likely to be completed in August 1953.

7. P. D. Varadarajan, Soil conditions and wilt of Plants with special reference to Trace Element Nutrition, for Ph.D., begun in August, 1949, ended in January, 1953.

8. G. Satyanarayana, Soil conditions and Cotton wilt with special reference to host physiology, for Ph.D., begun in August 1949 ended in January 1953.

9. V. Agnihothrudu, Soil conditions and wilt diseases in plants: Rhizosphere microflora in relation to fungal wilts, for Ph.D., begun in August 1950 likely to be completed in August 1953.

10. R. Kalyanasundaram, Soil conditions and wilt diseases in plants: Fungal wilts and changes in host metabolism, for Ph.D., begun in August 1950 likely to be completed in August 1953.

11. Miss P. Shanta, Trace element nutrition of soil fungi with special reference to *Fusarium moniliforme*, for M.Sc., begun in August 1950 likely to be completed in August 1953.

12. Miss L. Saraswathi Devi, Soil conditions and wilt diseases in plants: Essentiality of Trace Elements to some soil Fungi, for Ph.D. begun in August 1951 likely to be completed in August 1954.

13. S. Suryanarayanan, Growth factor requirements of some fungi, for Ph.D., begun in August 1951 likely to be completed in August 1953. (Growth factor requirements of "Piricularia" spp. and other crop parasites are being investigated.)

14. Dr. T. S. Sarojini, NIS Junior Research Scholar, Soil conditions and root diseases with special reference to Fusariase disease of Cajanus, begun in July 1951 likely to be completed in July, 1953.

15. Dr. B. G. L. Swamy, NIS Senior Research Scholar, The Comparative morphology and relationships of some of the families of the order Ranales, begun in August 1951, likely to be completed in July, 1953.

16. K. Ramakrishnan, Research Assistant, Soil conditions and Fungal wilt of plants—The Distribution and Behaviour of Fungi in Soils, for Ph.D., begun in August 1950 ended in January, 1953.

Zoology

1. K. Pampapathy Rao, Studies on Ptychodera Flava and other Enteropneusta of Madras, for Ph.D., begun in July 1948 ended in August 1951 (Complete anatomy and early embryology of Ptychodera flava is done. A systematic account of Tornaria larvae available in the Madras Plankton and their development. Regeneration of Ptychodera flava.)

2. K. Nagappan Nayar, Studies on the Amphipoda of the Madras Coast, for M.Sc., begun in July 1948 ended in January, 1951. (43 species of amphipods collected from Adyar and Cooum estuaries, etc., described Life history of a brackish water amphipod Grandidierella bonnieri stebbing, its mating and bearing eggs is studied.)

3. K. V. Sekharan, Fat contents of Fishes, for M.Sc., begun in July 1948 ended in August 1950. (The muscle-fats of four fishes Dussumeeria acuta, Trichurus haumela, Pellona hoevenii and Caranx (Selar) mate and the seasonal variation is done. Influence of temperature on fat noted.)

4. C. Mukundan, Studies on Gastropoda, for M.Sc., begun in July, 1948 ended in January 1951. (8 species of the cosomatous pteropods are recorded with accounts of swimming and feeding habits and Seasonal fluctuations are done. Copulation and spawning of undibranch, etc., are given.)

5. A. Daniel, Studies on the Cirripedia of the Madras Coast, for M.Sc., begun in July, 1949 ended in August, 1951. (Developmental stages of Barnacles are being worked. The rate of attachment of all the important sedentary organisms to different types of S. Indian timber.)

6. S. Krishnaswamy, Studies on Pelagic Copepoda of the Madras. Coast, for M.Sc., begun in July 1947 ended in August, 1950. (A systematic account, including notes on occurrence, distribution and salient morphological features of 113 species of pelagic copepoda of Madras coast is given.)

7. P. Vijayaraghavan, Food of a few common fishes of the Madras Coast, for M.Sc., begun in July 1947 ended in August 1950. (A copepod calender for Madras as well as Krusadai is prepared.)

8. S. Mahadevan, Digestive system of Fishes, for M.Sc.,begun in July 1948 ended in August 1950. (A biological and volumetric analysis of the stomach contents of 1906 fishes of 17 species belonging to 3 families namely Leiognathidae, Trichiuridae and Clupeidae has been done.

9. B. Krishnamurthi, Studies on the Nephridia of Polychaetes, for M.Sc., begun in July 1948 ended in August 1951. The anatomy and histology of the digestive system of a herbivorous feeder (Osphronemus goramy Lac a plankton feeder (Mugil cremilabis Forsk), and a carnivorous feeder (Caranaxdjedaba Forsk) done.

10. K. Ramalingam, Trematodes of Madras, for M.Sc., begun in July 1949 ended in August, 1952, (59 species of monogenetic trematodes and 7 species of digenetic trematodes collected from Madras fihses described. General remarks on the ecology, host parasite relationship host-specificity, etc.)

11. R. Narayanaswamy, Studies on a Brackish Water Bivalve of Madras, for M.Sc., begun in July 1949, ended in August; 1952. (The anatomy of Modiolus striatulus Henley is done. The 02 consumption under different environmental conditions, comparative tolerance to salinity the species from brackish and marine habitats are worked out.)

12. S. Ramamurthy, Plankton Studies, for M.Sc., begun in July 1950 ended in August, 1952. (The occurrence of the various planktonic organisms was studied and correlated with the hydrographical conditions. Measurement of diatom population by pigment extraction method was done.)

13. M. Sudhakara Prabhu, Biology of the Ribbon fish and ovary as indicator of spawning period in some fishes, for M.Sc., begun in July, 1945, ended in August, 1952.

14. V. Gopalakrishnan, Studies on the biology of the Madras, Penaeids, for Ph.D., begun in July 1949, likely to be completed (Physiology of digestion and absorption, oxygen consumption. Study of the fat contents.)

15. S. Gopalakrishna Nair, Studies on the embryology of these Malacostraca, for Ph.D., begun in July 1949, (A comparative account of the embryology of an isopod, amphipod, and a descapod.)

16. T. S. Ramaswamy, Fat contents of Fishes, for Ph.D., begun in July, 1950. (Fluctuation of the fatty acids in the muscle, liver, intestine and gonad of otolithus ruber, Polynemies indicus Upeneus indicus and clupea kanagurta.)

17. A. George Cherian, Respiration in Amora, for M.Sc., begun in July, 1951, likely to be completed in August, 1953. (Mechanisms of respi-

ration in the frog, and the physiological aspect of it comprising the oxygen consumption through the skin and lungs.)

18. V. O. Sebastian, Studies on the Ascidians of Madras coast, for Ph.D., begun in July, 1951 likely to be completed in August, 1953. (Development, experiments on metamorphasis, budding under tropical conditions, dedifferentiation and regeneration of ascidians, as well as recording the fauna around Madras.)

19. S. Krishnaswamy, Studies on the Copepods of the Madras coast, for Ph.D. begun in August, 1951. (Taxanomy, biology, ecology and bionomics of weed-clinging and sand-dwelling copepods.)

20. P. Vijyaraghavan, Studies on Fish eggs and larvae of Madras coast, for Ph.D., begun in August, 1951. (Identification, development of the various species of fishes with special reference to their food and feeding habits.

21. A Daniel, Studies on Barnacles of Madras, for Ph.D., begun in September, 1951. (Developmental stages of Barnacles are being worked. The rate of attachment of all the important sedenary organisms to different types of S. Indian timber.)

Oriental Research Institute

Sanskrit

I

1. Dr. V. Raghavan, Reader and Head of the Department, (*a*) New Catalogus Catalogourm, begun in the end of 1935, Vol. I published by Madras University ; further Vols. under preparation. (A revised, amplified up-to-date edition of Aufrecht's Catalogus Catalogourm, a complete alphabetical register of Sanskrit and Prakrt works and authors with references to Mss. all over the world, dates of authors, critical information and main editions of works.)

II

(*b*) Hindu Sacred Writings, American Council for Religion in Education ; Begun in the end of 1951 and likely to be published in 1953 (Introduction of Select renderings from Vedas, Brahmanas, Upanisads, Sutras, Dharma Sastras, Epics, Puranas, Gita, hymns, etc.)

III

(*c*) Cola Campu, begun in 1951, Published by Saraswati Mahal Library, Tanjore 1952. (A quasi-historical poetical work connected with the Cola kings of Tanjore ; edition with critical introduction and appendix.)

(*d*) Sahendravilasa, begun in 1950, Published by the Sarasvati Mahal Library, Tanjore 1952. (A historical poem on the life of King

Sahaji of Tanjore Mahratta dynasty; edition with a detailed account of the literary output in Tanjore during Sahaji's time.)

IV

(e) Yantras or Mechanical Contrivances in Ancient India begun in 1955, Published by the Indian Institute of Culture, Basavangudi, Bangalore, 1951, A complete account of the material on the subject Scattered in books and manuscripts in Sanskrit.

(f) The Social Play in Sanskrit, begun in 1951, Published by the Indian Institute of Culture, Basavandgudi, Bangalore, 1951, (Besides a history of the Social Play, it gives also a reconstruction of the Prakaranas quoted in dramaturgy but not available now.)

V

(g) Natakalaksanaratnakosa of Sagaranandin, begun in 1950, All-Indian Oriental Conference Paper; published in the Journal of the Gaughati University, 1951, (Papers. No. 7 gives a full set of corrections, emendations, parallels and glosses on this important but badly edited text on Sanskrit.)

(h) Somadevasuri and Bhojadeva, begun in 1950, All-Indian Oriental Conference Paper; published in the Journal of the Gauhati University, 1951, (Papers. No. 7 gives a full set of corrections, emendations, parallels and glosses on this important but badly edited text on Sanskrit.)

(i) Sobriquets in Sanskrit, begun in 1950, Published in Journal of Oriental Research, Madras, 1951, (Papers. No. 7 gives a full set of corrections, emendations, parallels and glosses on this important but badly edited text on Sanskrit.)

(j) Malabar in Anandaranga Pillai Diary, gives a full set of corrections, emendations, parallel and glosses on this important but badly edited text on Sanskrit.)

2. T. K. Ramachandran, Research Student concordance of Kalidasa's Poems, Research Studentship work, begun in 1936, to be published by Madras University shortly. (A quarter index to every verse in the three poems of the great poet.

3. G. Rajalaskshmi, Research Student Chemistry in Ancient India, Research Studentship work, begun in 1949, (Partially done.)

4. C. R. Swminathan, Research Student Kumaradāsa's Janakiharana, For M.Litt. begun in 1950, (An edition of the unprinted portion of this important Mhakavya, on the basis of 3 Mss., together with a critical study on the author and the poem.)

5. S. S. Janaki Research Student, Alankarasarvasa with Vidyacakravarttin's commentary, For M.Litt. begun in 1951. (A critical study and edition of an important commentary on a basic text of Alankaras, on the basis of 6 Mss.)

I

6. Dr. K. Kunjunni Raja, Senior Lecturer, (*a*) Unadikosa of Vedanti Mahadeva—Grammar, begun in 1951, To be printed by the Madras University.

(*b*) Unadimanidipika of Ramabhadra Makhin begun in 1952, Grammar. Under preparation ; to be published by the University.

II

(*c*) History of Grammatical Literature, begun in 1951, Under preparation : to be published by the University.

III

(*d*) Naisadhananda, a drama by Ksemisvara, begun in 1952, Paper published in the Annals of Oriental Research, University of Madras.

7. S. Subrahmanya Sastri, Junior Lecturer, (*a*) Bhattadipika with Prabhavali of Sambhubhatta—Uttara Satka, Mimamsa. Edition, begun in 1950, University of Madras ; to be published.

(*b*) Nyayaratnadipivali Advaita : Edition, begun in 1950, Serially printed in the Brahmavidya, Advaitasabha, Kumbhakonam, completed in 1952.

(*c*) Kenopanisadvyakhya by Lilasuka, begun in 1951, Printed in the Annals of Oriental Research, University of Madras, 1952.

(*d*) Brahati, begun in 1952.

(*e*) Nayaviveka—Prabhakara Mimamsa, begun in 1952.

Language and Literature

1. R. P. Sethu Pillai, B.A., B.L., Professor of Tamil, (*a*) Words and their significance, begun in 1951, Published by the University of Madras, completed in 1952, (Words and their Significance is a Study in Tamil Linguistics. It consists of there sections. The first deals with Language and Culture. The second deals with Semantics under the heads : Restriction, Expansion, Degradation, Elevation and variation. The third section deals with Discrimination of Synonyms.)

(*b*) A Comparative Vocabulary of the Dravidian Languages, begun in 1951, likely to be completed in 1953. (The Comparative Vocabulary of the Dravidian Languages is a Lexicon of Dravidian Cognates. About 4,000 primary words have been collected and classified. The introduction to this work will bring out the fundamental unity of the Dravidian Languages in Vocabulary and Culture.)

2. M. A. Dorairangaswamy, M.A., M.O.L., Senior Lecturer in Tamil, The Religion and Philosophy of Tevaram, begun in 1950, likely to be completed in 1953. (The Religion and Philosophy of Tevaram is a study of the personal forms of God, Creed, Religion,

Mythology and Temples of Tamil Country and of Philosophy, Autobiographical reference and Mysticism as found in Tevaran, especially in Sundarar Tevaram, in its Historical, Geographical, Sculptural and Agamic setting. (Tevaram is a collection of Devotional hymns in Tamil)).

3. B. R. Purushothama Naidu, Vidwan, Pandit, Junior Lecturer in Tamil, Tiruvaymoli—Ittin Tamilakkam, Volume I, begun in 1951 ended in 1952, Published by the University of Madras, The Commentary known as 'the Itu on Tiruvaymoli' (Sacred hymns of Saint Nammalwar) which is in the Manipravala Style, has been rendered into Tamil with notes and explanations. This is the first of a series of ten volumes.)

4. R. K. Sachinanda Sivam, Vidwan, Research Student, The Sacred Places of South India, begun in 1950, completed in September 1952 and submitted to the University. (This Work deals with the Sacred Places (Saiva and Vaishnava of South India) setting forth their Historical, Geographical and Religious importance.)

Psychology

1. Vijaya Sethumadhavan, High School Children's Friendship Basis on which they are formed and rejected, for M.Ed., begun in August, 1951, ended in 25th March, 1952. (The investigation was an attempt to study the reasons given by Children for choosing and not choosing to person to be their friend.)

2. Miss T. K. Nalini, An inquiry into the attitude of non-professional married women towards the course of studies and activities pursued by them at the University in the light of their present-day needs, for M.Ed., begun in August 1951. (The inquiry brought out many relevant features regarding the theoretical nature of the present curriculam.)

3. Ahmed Ali, An inquiry into the Backwardness of Pupils with reference to few cases in Madras Schools, for M.Ed., begun in August, 1950, ended in 1950. (This was an individual case of study of a number of very backward pupils selected from different schools in the city on the basis of school records and special tests.)

4. Miss Irene Manual, The Problem of Mental Hygiene in Schools, M.Litt. begun in 1946. (The investigation attempted to study the incidence of Behaviour Problems among the school children.)

5. T. E. Shanmugam, (*a*) A study of Adolescent Phantasies, begun 1950-51, ended in 1951-52, Paper published in the Madras University Journal (Humanities Section), (A study was made of school going children of a certain socio-economic group to find out their phantasies (Belongingness, needs, etc.)).

(*b*) A comperatives study of the TAT and VPT tests, begun in 1950-51, ended in 1951-52, Paper published in the Madras University Journal, (Humanity Section), (A story was made of school going children of a certain socio-economic group to find out their phantasies (Belongingness, needs, etc.)

6. Rev. H. D. Souza, A comparative study of Day Scholars and Residence Pupils with reference to their Achievement, begun in 1951, ended in August 1952 (An inquiry was made whether the Day Scholars or Residential Pupils have better achievement. The inquiry proved in almost all cases that the Residential Pupils were better. The investigation was only a preliminary survey.)

Politics

1. N. R. Bhat, Liberty and Function in the Modern Democratic State, for M.Litt., begun in 1949.

2. Vijayalakshmi Srinivasan, History of the Madras Secretariat, for M.Litt., begun in 1949.

3. V. V. Ramanamurti, Non-violence as a political principle, for M.Litt., begun in 1950.

4. R. Bhaskaran, Reader, Hindu Political Thought, begun in 1947.

Public Administration

1. C. P. Krishnamurti, Public Personnel Administration in the Madras State, for M.Litt., begun in 1951.

Administration

1. R. Bhaskaran, (Reader), Indian Constitutional Development, begun in 1947.

Indian Music

1. P. Sambamoorthi, Reader, (*i*) Research. In Lakshya (Musicology), (*a*) Tone system of Indian Music — Subtle srutis and the ragas wherein they figure. Published in South Indian Music: Book V. (With the help of the recently devised Pradarsana Vina one can understand the subtleties of the Indian tone system and also perceive the various musical laws, facts and phenomena. It is a concert instrument and a Demonstration instrument combined. It is a Samashti Vadya).

(*b*) The process of Model shift of tonic as applied to the 72 melakartas. Results incorporated in the newly composed composition: Murchhanakaraka mela ragamalika.)

(*c*) Research in Lakshya (Practical music), (Unknown compositions of minor composers, (*iii*) Musical compositions of Chevyur Chengalvaraya sastriar (1810—1900) are being published.

(*d*) Research in the History of Music. The biography of Tyagaraja and the sources which furnish details for the same, (*iv*) Some of the results of Research are incorporated in the Dictionary of South

Indian Music and Musicians which is being published in four volumes.

(*e*) Origin and Evolution of Geyanatakam.

(*f*) Contribution to the Technique of Veena play by Venkataramana Das and Sangameswara Sastri.

(*g*) The Pans of the Tevaram.

(*h*) Indian Musical Instruments, (Descriptive catalogue of Musical instruments in the Madras Government Museum II edition.)

2. Srimati R. Sarasvati, The Influence of Indian Music on the music of adjacent lands, for M.Litt.

3. R. Jayalakshmi, Seats of music in the Past in India, for M.Litt.

4. V. Sita Devi, Folk music of the Andhra Desa, for M.Litt.

5. R. Brinda, Sangita lakshanagranthas written between 1100 and 1700 A. D.

6. K. Annapurni, Poetic metres and their influence on the growth of the tala system.

7. Alamelu Govindarajan, Light thrown on the history of Indian music by Archaelogical and Epigraphical Records.

8. S. Seetha, History of Ragas and musical forms of South Indian music from 1600 A. D.

Biochemistry

1. D. V. Siva Sankar, (Government of India, Senior Research Scholar), and P. S. Sarma, Reader, (*i*) Studies on Biotin, for Ph.D., begun in July 1950, likely to be completed in July 1954, Five papers published in Jour. Sci. Ind. Res., Published in Vol. 10B. p. 3, 1951. (2) Vol. 10B, p. 294, 1951. (3) Vol. 11B, p. 63, 1952. (4) Vol. 11B. p. 122, 1952. (5) Vol. 11B. p. 394, 1952. (Studies on biotin have been carried out in three different organisms, the albino rat, the rice mouth larvae and the fungus Neurospora crassa. Biotin can be replaced to some extent byoleic acid. Biotalin has been found to affect nitrogen metabolism as well as the desatration of saturated fatty acids.

2. L. K. Ramachandran, (C. S. I. R. Research Assistant) and P.S. Sarma, Activity of thyroglobulin and other Iodoproteins, for Ph.D., begun in July, 1950, Published in Eour papers (*i*) Jour. Mad. Unir Vol. 21B. p. 118, 1951. (*ii*) Jour. Sci. Ind. Res. Vol. 10B, p. 246, 1951. (*iii*) Current Science, Vol. 21, p. 3, 1952. (*iv*) Jour. Sci. Ind. Res. Vol. 11B. p. 161, 1952.

(*ii*) Iodination of various cheap proteins, like casin, groundnut cake and silk fibroin have been carried out to obtain iodoproteins of high

Thyroxine activity. The effects on pure amino acids of Iodination have been studied and new colorimetric method of estimation of thyroxine has been developed.)

3. E. R. B. Shanmuga-Sundaram, (Government of India, Junior Research Scholar), and P. S. Sarma, Inter relationships between tryptophane and nicotinic acid, for Ph.D., begun in August, 1950, Punlished in One paper in current Science, Vol. 20, p. 122, 1951. (The conversion of tryptophane to nicotinic acid has been studied by use of anti-vitamins in germisnating eedlings and liver slices. Vitamin B_6 influences the conversion as also the d-isomer of tryptophane. which actually inhibits when present in large amounts.

4. V. M. Sivaramakrishnan, (Government of India, Junior Research Scholar) and P. S. Sarma, Influence of vitamins on nitrogen metabolims, for Ph.D., begun in September, 1950 likely to be completed in September, 1953. published in Jour. Mad. Univ., Vol. 21B. p. 75, 1951, The influence of sulfanilamide, p-aminobenzoic acid and folic acid on amino acid changes during germination has been investigated. Results so far obtained indicate that p-amnninobenzoic acid affects histidine metabolism but has no influence on the metabolism of threonine.)

5. R. Radhakrishnamurthy, (University Research Asst. in Biochemistry) and P. S. Sarma, Studies on the biogonisis of water soluble vitamins, for Ph.D., begun in January, 1951 likely to be completed in January, 1954, published in Jour. Sci. and Ind. Res. Vol. 11, p. 279, 1952. (A modification in the paper chromatographic method of separation of sugars and amino acids has been successfully carried out and the technique applied in the investigation of the biogenesis of riboflavin and thiamin when antivitamins like gammexane and disoxypyridoxin eare employed.)

6. T. K. Sundaram, (Government of India, Senior Research Scholar) and P. S. Sarma, Studies on excretory pigments, for Ph. D. begun in July 1951, likely to be completed in April, 1954. (The yellow pigment excreted by rice moth larvae (corcyra exphalonica St.) on a vitamin B_6 deficient diet containing tryptophane has been investigated and the pigment purified for study of its absorption characteristics.)

7. Miss M. Oommen and S. Ramachandra, (I. C. M. R. Research Assistants and P. S. Sarma, Enzymic role of Inositol, for M.Sc. begun in October 1950, ended in April 1953, Published in Current Science, Vol. 19, p. 315, 1950. (Shark liver have been carried out in rats, rabbits and other organisms, the biochemical role of inocitol, particularly in reference to its role as a coenzyme of a-anylase and its relationships in this respect with biotin.)

8. D. S. Venkatesh and K. V. Rajagopalan (Madras State Research Committee Research Assistant), and P. S. Sarma Antianaemic principles in shark and other fish liver residues, for M.Sc., begun in January 1951. (Shark liver residue has been shown to be a good source of folic acid and vitamin B_{12} and attempts have been made to obtain by papain digesion, a cheap protein hydrolysate)

9. N. R. Moudgal, (C. S. I. R. Laboratory Research Assistant) and P. S. Sarma, Studies on Iodinated proteins, for M.Sc., begun in October 1951, likely to be completed in April 1954. (Iodinated fibrin, castor seed cake, linseed and ground nut cake have been analysed for thyroxine and Di- iodotyrosine contents.)

10. G. Ranganathan, (Univ. Stip. Res. Scholar) and P.S. Sarma, Biosynthesis of ascorbic acid, for M.Sc., begun in January, 1952, ended in January, 1953, published in Current Science, Vol. 20, p. 122, 1951, (Biosynthesis of ascortic acid has been studied in germinated pulses, rice moth larvae and in the albino rat. In all these cases it was found by use of anti-vitamins that pyridoxine influences greatly the synthesis of ascorbic acid.

11. T. A. Sundararajan, (Univ. Stip. Res. Scholar) and P. S. Sarma, Purification of Phosphorprotein phosphatase, for M.Sc., begun in September 1950, likely to be completed in October, 1953. (Phosphoprotein phosphatase has been purified by fractional precipitation with Ammonium Sulphate and acetone and its properties have been studied. Dephosphorised casein has been prepared by enxymic digestion and its amino acid composition compared with that of casein.)

12. M. O. Tirunarayanan, (Univ. Stip. Res. Scholar) and P. S. Sarma, Studies on the inter relationship between buiotin and inositol, for M.Sc., begun in September 1950, ended in January, 1953, published in Jour. Sci. and Ind. Res. Vol. 11B p. 63, 1952. The biochemical role of biotin in the diamination of pure amino acids has been investigated. Further, by using gamnuxane the antivitamin of inositol, the inter relationship between biotin and inositol has been studied in two fungi, Neurospora crassa and aspergillus niger respectively).

Telugu Language and Literature

1. N. Venkata Rao Senior Lecturer in Telugu, (*i*) Udaharana Literature in Telugu with original text, Published in Anada Press, Madras, 1950, (This is the first systematic treatment of Udaharanas a rade type of Desi Literature is Telugu, which is not found in any of the Dravidian Vernaculars.)

(*ii*) Katta Varadaraju Dwipada Ramayanam in four volumes, Published in Madras Government Oriental Series (Tanjore Library), (This work is a faithful translation of Valmiki Ramayana written about 1630 A. D. and the biggest dwipada work. The introduction contains a valuable criticism and a complete bibliography of Ramayana Literature in Telgu.)

(*iii*) Rajagopalavilasamu, published in Ratnam Press, Madras 1950—52, (The work written about 1650 A. D. gives a graphic description of Poetry, Music and dancing in the time of Vijayaraghava nayaka of Tanjore (1633—1673).

(*iv*) Lives of Telugu Poets from earliest times (85-1250—A. D.) In the course of publication in 1952. (The work is written on modern lines, gives an account of 140 writters with all verse inscriptions critically edited. The poets are described according to the literary periods from 850—1250 A. D. with a critical analysis of their works. Contains bibliography and appendecies.)

(*v*) Bibliography of Dwipada Kavya Literature, published in Annals of the Oriental Research Institute 1952. (As the name suggest this is a bibliography of available dwipada Kavyas, a well known Desi type of literature. Pudukkottai, Mysore, Turayur and Salem.)

(*vi*) The Southern School in Telugu Literature. (This is the first systematic attempt of the history of Telugu literature outside Telugu country, *i.e.*, Tanjore, Madura, Pudukkottai, Mysore, Turayir and Salem.)

Telugu

1. S. Ramakrishna Sastry, Junior Lecturer "History of Telugu Literature" upto 1350 A. D., begun in November 1950, ended in 1st March 1952. (In the introduction critical standards and influential agencies are dealt with The works, the poetic arts, and the poet's place in literature are given about, Nannayya, Nannichuda, Tikkana (Mahabharata). His contemporary Kethana (Kumarasambhava Marana (Markandeya Purana) Palkuriki Somanatha and Veerasaiva culture. Ramayana and Vaishava culture. Erra pregada and Nachana Soma.)

2. G.V. Krishnaih, Literature and its value in life with special reference to Kalapurnodayamu, begun in June, 1949. (This is a systematic study of the principles of aesthetics not only from oriental point of view but also of western Philosophers like Aristotle, Plato, Kant plautions etc., as applied to Telugu Literature with special reference to Kala-purnodayamu, the most original work in Telugu Literature.

Kannada

1. M. Mariappa Bhat, Reader, (*i*) Kannada Sanskriti, begun in 1950 ended in 1951, Published. (Three lectures delivered under the auspices of the Kannada Research Institute, Dharwar. A study of Kannada culture from three sources (*i*) Desya words, idioms, Proverbs, (*ii*) Literature, (*iii*) inscriptions.)

(*ii*) Sadguru Rahasya, begun in 1951, and completed, Published by Government Oriental Mss. Library, Guru Basava's work on Veerasaiva philosophy, edited with critical notes and introduction.

(*iii*) Mangabidhana, begun in 1949, and completed before the close of 1952, Published by Madras University, (A very useful lexical work in verse (13th-century) hitherto unpublished. Introduction and complete index of all the words occurring in the lexican. Printing almost over.)

2. Jointly by the Reader and the Junior Lecturer, (*i*) Vardamana Purana

of Achanna, begun in 1951, Published by Madras University, (A hitherto unpublished classical work in Kannada of the 12th century. Extremely helpful for a student of (Jaina) Philosophy Literature and Linguistics.)

(*ii*) Paraswanatha Purana of Parswanatha Pandiata, begun in 1951, ended before the close of 1952, Published in Madras University. (A hitherto unpublished classical work in Kannada of the 13th century. Extremely helpful for a student of (Jaina) Philosophy Literature and Linguistics.

3. M. Govinda Rao, (Junior Lecturer), Yakshagana Sahitya, begun in 1949, Published by Madras University, 6. (The origin of the word Yakshagana, prevalance of this kind of Folk-Drama in other areas, etc. Its technique. Yakshagana Poets. Modern tendencies, etc.)

4. A Shankar Kedilaya, (Research Student), Nagavarama I, begun in 1950-51 ended in 1953, Deposited in the University Library, 7. (His date, excellence of his work Contemporary social elements as reflected in his work, etc.)

Malayalam

1. Dr. S. Krishnan Nayar, Head of the Department (*i*) Folk Darama of Kerala, for D.Phil, begun in 1946, completed in 1951. (The thesis contains an elaborate description and critical study of the following types of Folk-Plays that were in vogue in Kerala.) (1) Tiyyattu, (2) Mutiyerru, (3) Ayyoppa Pattu (4) Tirayattam (5) Tolppava kkuttu (6) Elamattu Kali, (7) Yatra Kali, (8) Minakshi Natakam (9) Kamsa Natakam, (10) Cavittu Natakam (11) Kurattiyattam (12) Pankali or Tekkatti Natakam.

(*ii*) Folk-Dance of Kerala, begun in 1950, likely to be completed within two years. (Various types of folk-dances that are connected with the Mother-Cult and Snake-Cult of Kerala are dealt with. Moreover the classical and secular types of dances also are included in the work.)

2. V. Anandakuttan Nayar, M.A., Research Student, Deputed by the University of Travancore, "Campu Literature in South Indian Languges," for Ph.D., begun in 1951, likely to be completed within two years. (The student is making a thorough investigation and study of the Campu Kavyas in South Indian Languages, *viz.*, Malayalam, Tamil, Kannada and Telugu. Now he has completed the study of the origin of campu Literature in Sanskrit).

A. C. College Technology

Organic Chemistry

1. Dr. K. N. Menon, Professor 2-and-3 substituted quinazolones, begun in July 1952, completed Part I about May 1953. (The Alkaloids Evodiamine, Rutaecarpine and Febrifugine are derivatives of 4-Quinazolone. The quonazolone ring is of great potentiality from the point of view of medicinal chemistry and no systematic explora-

tion of the field seems to have been undertaken. It is proposed to fill up this gap.)

2. Miss M. Indravathi, Research Scholar, 4-Phenyl substituted quinazolines, for M.Sc., begun in July, 1951, Part I to be completed about May 1953. (Certain quinoline derivatives are strongly antiphyretic as well as antiseptic. Many of them act as central nervous system depressants and exhibit considerable toxicity. Considerable work has been done on alkyl derivatives of quinolines and iso-quinolines. The quinazoline ring incorporates the characteristics of both and systematic work is lacking. The present work is to explore the field)

3. N. S. Sundarajan, Research Scholar, Modified cyclo-pentanphenanthrenes, for Ph.D., begun in October, 1952, Part I to be completed about October, 1953. (It is expected that analogues of hormones of the sterioid group with ring B five-membered should be of considerable interest. New synthetic methods have been explored with partial success and the exploitation of the methods for full understanding is being persued.

4. M. R. Subaram, Research Scholar, Studies in Phenothiazene for M.Sc., begun in July, 1951, Part I to be completed about July 1953. (The bactericidal and fungicidal properties of phenathiazine derivatives are well known. Recent work has shown that some of the derivatives are very potent anti-histaminics. The present work is to synthesise 10-alkyl amino derivatives and their oxides.)

Department of Arabic, Persian and Urdu

1. Dr. S. Muhammad Husayn Nainar, Professor, (*i*) List of Arabic and Persian Words in the Tamil Language. (During the centuries of Islamic influence in India every language in the country was gradually permeated with words and expressions of the language of the ruler in varying degree according to the nature of the contact. The tamil language is no exception to it. A certain percentage of Arabic and Persian words have come to say in the spoken as well as written language. A list of these words is given in this work.)

(*ii*) Seydakkadi Varalaru. (This work includes Sedakkadi Nondi Natakam already published by the University in 1939 and the following work *Seydakkadi Peril Kalyana Vashthu* got ready for the press by the author. In the place of the English introduction to the *Seydakkadi Nondi, Natakam* published in 1939 an introduction in Tamil giving a fuller account of the Biography of Seydakkai together with other historical details relating to the second half of the seventeenth century A. D. are included.)

(*iii*) Biographical Sketches of Tamil Muslim Poets. (This includes biographical sketches of nine well known Tamil Muslim poets from the middle of the 17h Century to the end of the 19th century. The Tamil Muslim poets, who apparently conform to the arrangement and style in poetical composition current in the Tamil language, have introduced new ideas relating to Islam and its culture and have enriched the Tamil Language in various ways. This is the first work of its kind not attempted by any one.)

(*iv*) History of Islam in South India, (The aim of the proposed survey-is to trace the strands which mark the impact of Islamic culture on South Indian life and culture, and to determine in historic sequence and perspective the growth of new communities, Muslim in religion and Indian in pattern, which are clearly distinguishable from the parent stock from which they have branched off in their ways of living and cultural outloook. The survey will necessarily cover both the material and spiritual aspects of life.)

(*v*) Kerlapazhama. (This is a rare Malayalam work giving a clear picture of the arrival of Vascodagama to Malabar and the earlier activities of the Portuguese on the West Coast of India. This work will form a companion volume to the English Translation of the Arabic work Tuhfatul-Mujagiddeen published in 1942. The above work is being translated into English in collaboration with the Department of Malayalam.)

(*vi*) Maqamat-i-Veluri by Baqir Agah Qassid-Agah Texts are completed. Collecting matrials for the biography of the author. (These two Arabic works are composed by Mawlana Baqir Agah, the well-known Arabic and Persian scholar of the Tamil Nad, in the second half of the Eighteenth century A. D. The theme is in imitation of the Arabic work. Maqumt-i-Badiuz Zaman by al-Hamadani (1007 A. D.).

Persian Poetry

1. A. S. Usha, Junior Lecturer, (*i*) Diwan-i-Awhadi, Published by the University of Madras in 1951. (A collection of exhortative Qasidas. Ghazals in mystic style, etc., by Awhadi of Maragha, a Maragha poet, and moralist, born about 672 A. D. (Circa 1273 A. D.) and died in 738 A. H. (Circa 1337 A. D.)

(*ii*) Diwan-i-Ubayd Zakani, Published by the University of Madras in 1952. (A collection of Qasidas, Ghazals, a Mathnawi, etc., by the wellknown satirist, Ubayd Zakani. He lived in Shiraz during the regin of Abu Ishaq Injo. He died in 773 A.H. (Circa 1371 A. D.)

History

1. A. S. Usha, Junior Lecturer, (*i*) Fathnama-i-Mahmudshahi, completed in 1951. (An account of some of the events in the reign of Sultan Mahmud Shah Bahmani II, during whose reign disintegration of the Bahmani kingdom took place, by Ayani, a contemporary. in Persian verse.)

(*ii*) Selections from Jami-ul-Hikayat, likely to be completed in 1953. (Selections in Three parts from the huge collection of historical anecdotes, *Jami-ul-Hikayat,* by Muhammad Sadiduddin Awfi who completed the work under the patronage of Sultan Iltumish's vizier Muhammad bin Abi Sad Junaydi.)

(*iii*) Waqai-i-Saltanet-i-Muhammad Shah, likely to be completed in 1953. (It gives an account of the invasion of Nadirshah, weak position of the Sultanate during the reign of Muhammad Shah, the intrigues at the Mughal Court, etc., by a contemporary writer who chooses to be anonymous.)

Rhetoric, Prosody

1. Mr. A. S. Usha, Junior Lecturer, Kanz-ul-Fawaid, completed in 1951. (A treatise dealing with literary criticism, Rhetoric, Prosody, etc., by Husain Muhammad Shah Shihab Ansari who lived during the reign of Sultan Alauddin Khalji.)

Travel

1. A. S. Usha, Junior Lecturer, Shigarf-nama-i-Wilayat, likely to be competed in 1953. (The author of the work is Itisamuddin son of Tajuddin, a native of Nadia District (Bengal) The work contains an interesting account of the author's sojourn in Britain during 1767—1768 A. D.)

Persian Prose

1. Muhammad Yousuf Kokan, Junior Lecture Kitab-al-Rasail by Baqir Agah (1745—1805 A. D.), completed in September 1950. (It is a theological work discussing the points at dispute between the Sunnis and Shias. The author lived in the second half of the 18th century A. D.)

Urdu Verse

1. Muhammad Yousuf Kokan, Junior Lecturer (*i*) Tuhfat-al-Ahbab by Baqir Agah, completed in April 1951. (Religious literature relating to the merits and virtues of the first four Caliphs after the Prophet and some of his prominent companions such as Abbas and Hamza, the uncles of the Prophet and Sad bin Abi Waqas, Zuhair bin Awwam and others.

(*ii*) Riyaz-al-Jinanby, completed in October, 1951, by Baqir Agah (Religious literature relating to the merits and virtues of the Caliph Ali, his noble wife Fatima, their sons Hasan and Husain and their descendant).

(*iii*) Naw Bahar-i-Ishq by Nawab-Mustaqim Jung Bahadur Nami (1767—1824) of Madras, completed in Augst, 1952. (It is a mathnawi written in imitation of Nizami Ganjawi, the master of romantic mathnawi and Amir Khusro of Delhi. The theme is the wellknown story of Khurso Parwers, Farhad and Shirin.)

(*iv*) Wrote a paper in Urdu on the life and works of Baqir Agah of Vellore (Madras). The paper was completed in February 1950. It is awaiting publication, completed in February 1950.)

Alagappa Chettiar College of Technology, Guindy

Chemical Engineering

1. Dr. G. S. Laddha, Reader and Mr. B. Chennakesavan, Senior Lecturer, Heat Transfer through packed towers, begun in July 1952, likely to be completed in 1953. (Study of heat transfer in packed towers and correlation of heat transfer coefficients

2. B. Chennakesavan, Senior Lecturer Catalytic cracking of oils, for Ph.D., begun in July 1952, likely to be completed in 1954. (Cracking of oils under the influence of various catalysts and to study the types of decomposition products obtained.

3. Mr. S. Venkataraman, Demosntrator, (*i*) Vapour liquid equolibria of some ternary systems, for M.Sc., begun in January, 1950 likely to be completed in January 1954. (To study the effect of salts on the relative volatility of binary mixtures. The study is to investigate any possible means of correlation and the use of salts as extractive distillation agents.)

   (*ii*) Salt effect on rates of drying, begun in Septembr 1952, (To study the nature of the drying curves when salts are present in the stock to be dried.)

4. Mr. R. S. Raman, Demonstrator, Sedimentation Analysis of fine powders, for M.Sc., begun in January, 1950, likely to be completed in January 1954. (Determination of particle size distribution of fine powders by means of Sharpless super centrifuge.)

5. Mr. C. N. Chandrasekharan, Demonstrator, Liquid, liquid extraction, for M.S.c., begun in April, 1950 likely to be completed in 1953. (Studies in counter-current liquid-liquid extraction and correlation of flooding velocities with physical variable.)

6. T. A. Poonnen, Government of India Senior stipend scholar, Flow of suspensions and sludges, for M.Sc., begun in July, 1950, ended in January, 1953. (To study the pressure drop in the flow of suspensions through pipes and its correlation with physical variables.)

7. M. G. Subba Rao, Goverment of India Senior scholarship holder, Studies in Filtration, for M.Sc., begun in November, 1951, ended in January, 1953. (Studies in filtration with special reference to filter aids.)

8. G. Venkataraman, Research scholar on a stipend from Hanumandas Oil Mills, Khamgaon Studies in the processing of vegetable oils, for M.Sc., begun in February 1952. (Equilibrium studies of the ternary systems involving vegetable oils-oleic acid and solvents.)

Chemical Technology

1. Dr. B. P. Janardhan, Senior Lecturer in Industrial Chemistry, (*i*) Electrolytic Reduction of Fatty Acid Nitriles to their corresponding Amines, for Ph.D., begun in 1950, completed in 1952. (Electrolytic

Reduction in presence of Raney in ammoniacal methyl alocholic medium. Reduction proceeds with 70—90 per cent. efficiency. Products have been isolated, analysed and confirmed, Bases for detergents.)

(*ii*) Purification of Stearic Acid, begun in 1950, completed in 1952, Published in Journal of Scientific and Industrial Research, V. 9 B, pages 46—49 (February 1950). (Mixed solvent fractional crystallisation used to isolate stearic acid from palmitic acid.)

(*iii*) Nitriles from Fatty Acids, begun in 1950, completed in 1952, Published in the Journal of Scientific and Industrial Research, V. 9 B, pages 208—210, (August 1950). (Ammoniation of fatty acid methyl ester.)

(*iv*) Review on Detergents, begun in 1950, completed in 1952. Publisbed in Madras University Journal Vol. 19 (1950). Collection of papers and patents on different types of detergents, their properties and uses.

2. Dr. P. B. Janardhan and Mr. D. P. Kannayya Pillai, Senior Lecturer in Industrial Chemistry and Demonstrator, (*i*) Dehydration of Castor oil, begun in 1950, completed in 1950, Published in Indian Soap Journal Vol. 16, page 51 (1950).

(*ii*) Resins from fixed oils, begun in 1950, ended in January, 1950, Published in Indian Soap Journal Vol. 17, page 52 (1951).

3. D. P. Kannayaya Pillai, Demonstrator, Plastics from Vegetable oils, for M.Sc., begun in 1950. likely to be completed in January, 1955, (Work is to produce plastics from vegetable oils by trying to increase unsaturation in the oil (castor oil) by dehydration, chlorination and dehydrochlorination. Fatty acids liberated from the above product, can be esterified with polyhydroxy compounds thus increasing the unsaturation per molecule.)

Statistics

1. Dr. D. V. Rajalakshman (Head of the Department), Stochastic Processes, begun in September, 1950. The part of the work completed under the title " Simultaneous Autoregressive Times Series and their Statistical Analysis " was submitted as a thesis, for which the Ph.D. degree was awarded by the University of Manchester. The actual applications of the theory developed are now being taken up as a part of the work of the Department, published in Joint paper with Prof. Bartlett on " Goodness of Fit Tests for Autoregressive series " sent to JRSS, The branch of study is associated with simultaneous stationary stochastic processes. Suitable probability models have been suggested for simultaneous series of observations. After completing the study of problems of specification, those associated with the estimation of parameters and other constants needed for inference were taken up for a detailed examination. Then the aspect of goodness of fit has been discussed in relation to correlograms and spectural transforms. A symptotic tests have been derived with the

help of symbolic operators for testing goodness of fit. The corresponding study in continuous time has also been in progress. The results derived for two series have been extended in general for any number of variable. The problems associated with the asymptotic character of the theory are being considered. Also the scope of simultaneous autoregressive schemes in actual applications is being examined.)

2. G. Ramachandran (Senior Research Fellow, Government of India), Sequential and Non-parametric Tests, Registered for Ph.D., begun in July, 1950, Intends to complete some aspects of the work and submit for the Ph.D. degree in July, 1953 Papers published: (*i*) On a test whether two samples are from the same population, Published in (Journ. Med. Univ. 1951). On non-parametric tests, the modified criterion, based on combining the range in run lengths to the total number of runs with the exact distribution of the statistic and tables of significance levels have been compiled. The sum of squares of lengths of runs has been used as a criterion for non-parametric two-sample test and a distribution of this statistic has been studied.

(*ii*) A note on the momemts of a function of 'Run Lengths' (Jou. Mad. Univ. July, 1952.) On sequntial analysis, following the work of Baker, two differnt approximations were tried to evaluate the integral obtained by him. The study of the distribution of sample size is being done using the tetrachloric series and Kac's integral equation.

3. O. Suryanarayana (Junior Research Fellow, Government of India), Statistical Studies in Analysis of Time-Series, for M.Sc., begun in July, 1950. The work on time series completed upto end of 1951 was submitted as thesis for the M.Sc., degree. He has been awarded the degree for his work on "Statistical Studies in the Analysis of Time Series," Papers published: (*i*) A Statistical Study of the Import Trade of India, 1900—1938 Pnblished in (J. Mad. Univ. Vol. 20, Series B.) (The work, besides statistical analysis of the import trade figures, covers some aspects of the theory of time series. Methods have been proposed for simultaneous estimation of the components in time series and testing significance of these estimates. Study has also been made of the variate difference method for the analysis of two time-series to determine the degree common to the polynomial trends. At present work is in progress on the bias in the estimation of serial correlation coefficient from the different series.) A note on the correlogram of the generalised moving average Published in (J. Mad. Univ. Vol. 22, Series B.)

4. M. S. Sundararajan, (Junior Research Fellow, Government of India) Distribution Theory of Runs and Patches, Registered for M.Sc., begun in September 1950, Intends to submit thesis in August, 1953) Paper published :—(*i*) The theory of probability distribution of points on a circle. Published in (J. Mad. Univ. Vol. 22, Series B.). (After completing some investigations on a skew bivariate surface and a two variate type I distribution, the work on theory of runs and patches is being pursued. In this problems associated with distribution of quadruplets of points on the circumference of a circle are being studied. In addition work is also in progress on the distribution of points in a rectangular field and analysis of time-series.)

5. P. A. George, (Senior Research Fellow, Government of India), On the theory of testing of composite hypotheses, Intends to register for Ph.D., begun in April, 1952. (On the Genral Theory of composite hypotheses, the study is directed towards finding a ' formal solution ' to the problem of obtaining all possible critical regions on the new criterion studied by S. N. Roy. A test independent of both mean and variance of a normal population has been derived.)

MAHARAJA SAYAJIRAO, BARODA

Feculty of Arts, Baroda Collge

Sociology

1. Dr. M. N. Srinivas, Head of the Department, (*i*) Sociological study of a village in Mysore.

   (*ii*) Prospects for Sociological Research in Gujarat, A paper for Gujarat Research Conference 1952.

2. Dr. I. P. Desai, Reader, (*i*) A Socio-Economic survey of College and School students of Poona, begun in 1952, In the progress of Completion.

   (*ii*) Social basis of Crime.

3. Y. V. S Nath, Research Asstt., (*i*) Social structure a tribe in Gujarat, for Ph.D., begun in 1952, completed.

   (*ii*) Some aspects of the Social structure of Bhils, begun in 1952, Completed. A paper for the Gujarat Research Conference.

4. H. R. Trivedi, Research Scholar, (*i*) The Mehrs of Saurashtra and Rajputana—a study in social structure, for Ph.D., begun in 1952.

   (*ii*) A study of the tattoomarks of the Mehrs, begun in 1952, to be published in the M. S. U. Journal No. 2.

   (*iii*) Kinship dispute in a Gujarat village, begun in 1952, A paper to be read before the Guj. R. Conference.

   (*iv*) A study of the Customs and ornaments of the Mehrs, begun in 1952, A paper to be read before the Guj. R. Conference.

5. S. Das Gupta, Lecturer, Study of social structure in a Bengal village, for Ph.D., begun in 1952.

6. P.T. Thomas, Lecturer, Muthuvar of Travancore, A study in Social structure, for Ph.D., begun in 1952.

7. V. Dasgupta, Lecturer, Sociological study of a Tamil Village, for Ph.D., begun in 1952.

Sanskrit

1. Miss Satyavati G. Shah, Ramayana from a literary point of view, for Ph.D., begun in 1950, likely to be completed by the end of 1953. (Analysing the Ramayana into its bare narrations, attempt is made to see wherein lies the literary art of the poet.)

Gujarati

1. I. A. Dave, M.A., Tutor, A critical survey of Old Gujarati literature (1136—1424 A. D.), along with the study of cultural data supplied by it, for Ph.D., begun in 151 ended in 1952.

2. S. H. Joshi, M.A., Tutor, A critical edition of the *Jnana Gita* of Narahari (1616 A. D. along with a study of the Jana Margi poets in old Guj. Literature, for Ph.D., begun in 1951, ended in 1952.

3. R. M. Patel, M.A.B.T., Lecturer, A critical edition of the *Simhasana Batrisi* (1463 A. D.), of Malayacandra and a comparative study of the story cycles of Simhasana Batrisi in Old Guj. Literature, for Ph.D., begun in 1951, ended in 1953.

4. B. P. Chokshi, M.A., Lecturer, The Dilect of Charotaria—a Linguistic study, for Ph.D., begun in 1951, ended in 1953.

5. P. D. Patel, M.A., B.T., Influence of Suddha daitya Philosophy on Old Gujarati Literature with special reference to Dayarama, for Ph.D., begun in 1951, ended in 1953.

6. Prof. B. J. Sandesara, A critical edition of the Shashtishataka Prekarana of Nemicandra with three prose commentaries, ended in 1952, to be published by the University.

Archaeology

1. Dr. B. Subbarao, Head of the Department, Archaeological Survey of Pre-Solanki, Gujarat, begun in 1950, May be completed in about 5 to 6 years, published in Archaeological explorations in the Mahi Valley Journal of the M. S. Universty Vol. I. No. 1—1952. (As part of the general scheme explorations was carried out in the Mahi Valley for the Prehistoric period and Kathiawad for early historic—conducted an excavation in Baroda area.)

2. R. N. Mehta, Tutor, Archaeological Survey of Central and Southern Gujarat, for Ph.D., begun in 1950, likely to be completed in 1954. (Carried a survey of Archaeological of Baroda and Surat District after studying the early inscriptions and the identification of place and names occurring therein. It resulted in the discovery of a number of earlier sites.)

Economics

1. Dr. S. Chandrasekher, (*i*) Hungry people and Empty lands—A research study on world population Problems and Inter-national tensions, begun in 1949, ended in 15th November 1952. Published on 15th November 1952.

(*ii*) A social survey of Baroda City, " A socio-economic " enquiry and attitudes towards family planning, begun in June, 1952, likely to be completed in 1954, Published in March 1953. Final book will be published in 1954.

(*iii*) Indians in South Africa, A survey examining the origin, growth and present position of Indian emigration to South Africa, begun in June, 1952, likely to be completed in 1954. Published in November 1952.

2. D. J. Bhagat, Economic plannnig in India, for Ph.D., begun in June 1951 ended in June, 1953.

3. M. R. Kotdawala, Cooperation in India, for Ph.D., begun in June 1951, ended in June 1953.

4. P. N. Dhar, Industrial Co-operation in India with special reference to Bombay State, for Ph.D., begun in June 1951, ended in June, 1953.

5. K. Sunderrajan, Rural Finance in India, for Ph.D., begun in June, 1951, ended in June, 1953.

6. T. Talati, Population and national income in India, for Ph.D., begun in June, 1951, likely to be completed in June, 1954.

7. K. C. Chakravarti, Economics of Tourist travelling with specil reference to India, for Ph.D., begun in June, 1952, likely to be completed in June, 1954.

8. S. K. Dey, Unemployment in India, for Ph.D., begun in June, 1952, likely to be completed in June, 1954.

9. N. C. Agrawal, Population and Food Supply in India, (1900—1951), for Ph.D., begun in June, 1952, likely to be completed in June, 1954.

10. R. M. Patel, Agriculture labour in Gujarat, for Ph.D., begun in June, 1952, likely to be completed in June, 1954.

11. D. K. Shukla, Manu, Malthus and Marks, for Ph.D., begun in June, 1952, likely to be completed in June, 1954.

Philosophy

1. A. G. Javadekar, " Approach to Rality " for Ph. D. degree awarded by the Bombay University, Completed in January 1952, (An ethical approach to the problems of Methodology Epistemology and Logic, the scope of which studies is made comprehensive.)

Marathi Literature

1. Dr. V. P. Dandekar, Critical survey of Marathi Literature from the early beginnings upto 1950, completed in 1952, Published by Sayaji Sahitya Mala, Baroda, for M.Sc. (The writer has shown how the social, political and religious conditions in India and especially in Maharashtra have influenced from the beginning upto 1950.)

Faculty of Science

Chemistry

1. Dr. C. S. Patel, Professor and Miss S. Doctor, for M. Sc., (Chemical and electrolytic oxidation of glucose to gluconic acid and its consequent conversion into calcium gluconate have been carried out. Similar studies on galactose and lactose hydrolysates have also been carried out and the appropriate calcium salt prepared.)

2. Dr. C. S. Patel, Professor and Parikh, for M. Sc., begun in July, 1951, ended in May, 1953, Investigations on the nutrititive components of 'guar' (cyamopses psoraliodes) are undertaken. A complete analyses of the mineral, protein and carbohydrate ingredients and a thorough examination of the amino acids of the component proteins is being carried out.

3. Dr. S. M. Sethna, Reader and S. S. Lele, Brominations of Coumarins, for M.Sc., begun in July, 1951, ended in May 1953, 5-Hydroxy-4-methyl Coumarin and its methyl ether have been brominated with different-quantities of bromine with a view to find out the relative reactivity of the different positions in the above coumarin derivatives.

4. Dr. S. M. Sethna, Reader and R. B. Seju, Demonstrator in Chemistry, Coumarins from Orcinol derivatives, for Ph.D., begun in July, 1951. (Orcinol and oreacetophenone monomethyl ether have been subjected to reaction with cyanacetic ester and ethyl carbonate and 4-hydroxy coumarin derivatives have been synthesised.)

S. J. Science Institute

Physics

1. Dr. D. V. Gogate, Reader and G. Z. Shah, Lecturer, Suction and Compression by lungs, for Ph.D., begun in January, 1950, completed in June, 1951, Preliminary Note published in Current Science, April, 1950. (The action of human lungs is compared with that of an air pump and it is shown that the usual formula for the pressure in the receiver of an air pump is applicable to human lungs, also.

2. Dr. D. V. Gogate and K. R. Chaudhari, Senior Lecturer, Motion of sphere through a viscous liquid, begun in February, 1951, completed in March 1953, Preliminary Note published in Ind. Sci. Congress Proceedings, Part III, January 1952. (A method for determining the position of the plane at which a sphere falling through a viscous liquid attains its terminal velocity Vt is described. A relation between At and the time to require to attain the velocity Vt is then derived. Agreement between theory and experimental results appears satisfactory.)

3. Dr. D. V. Gogate, Reader and D. G. Kapadnis, Demonstrator in Physics,Heath losses and their dependence, on Air-Velocity,for Ph.D., begun in October 1950, First part completed in July1951; Second part likely to be completed by October, 1953, Published in Ind. Jour. Physics Vol.26, April,1952. (The variation of convective heat loss with air velocity for vessels of different shapes and sizes is investigated. The rate of heat loss is found to depend upon the shape of the vessel and varies directly as the square-root of air velocity.

Botany

1. V. G. Phatak, Teacher and N. K. Patel, A contribution to floral Organogeny and Embryology of Gentianaceae, for M.Sc., (Bombay), begun in 1947, completed in 1950.

2. V. G. Phatak, Teacher and S. N. Padate, Indian Mosses, for Ph.D., begun in 1950, likely to be completed in 1955.

3. V. G. Phatak, Teacher and L. K. Gaekwad, Cytology and Embryology of Mimosae, for Ph.D., begun in 1951, ended in 1953. A part of the work published in the M. S. University Journal Vol. II.

4. A. R. Chavan, Teacher and B. S. Kelkar, Flora of Pavagadh with special reference to its ecological significance, for Ph.D., begun in 1950, likely to be completed in 1955.

5. A. R. Chavan, Teacher and M. B. Rane, Ecological study of Important grasses in Gujarat, for Ph.D., begun in 1951, likely to be completed in 1955.

6. A. R. Chavan, Teacher and Y. S. Deshmukh, Cytological floral organogeny and structure of development of the Micro and Megaspores and their game to phytes and embryologeny in Roettlera Hamosa, (R. Br.) K2 Var unifolia (Cl.) O. K2, for M.Sc., (Bombay), begun in 1948, completed in 1952, A part of the work published in Baroda University Journal Vol. II.

Zoology

1. R. V. Shah, and Dr. J. C. George, Teacher, The Anatomy and Physiology of Chelonia with notes on its evolution, for Ph.D., begun in 1951, likely to be completed in 1953, Part of the work is published in the Journal of the M. S. University of Baroda. Vol. I. No. 2, 1952. (The Anatomy and Physiology common pond turtle is worked on detail and discussion on certain salient points from the evolutionary points of view is given.)

MYSORE

Maharaja's College

Philosophy

1. K. N. Venkatarayappa, Lecturer, A problem in social Icology, for Ph.D., begun in 1950, completed in 1952.

2. V. Muddalinganna, Asst. Professor, "Old Age" A sociological Study, for Ph.D., begun in 1951, to be completed in 1953.

3. H. V. Narayan, Lecturer, Technology and Human Relationship, Fellowship Research, begun in 1952, likely to be completed in 1954.

4. Smt. H. T. Shanta, Lecturer, Philosophical Skepticism in Eastern and Western Thought, for Ph.D., begun in 1951, completed in 1953.

5. Smt. C. Parvathamma, Lecturer, Human Rights, for M.A., begun in 1950, completed and secured M.A., Degree.

6. M. N. Narasimhan, Lecturer, Philosophy of Sri Ramanuja, for Ph.D., begun in1951, to be completed in 1953.

7. H. N. Raghavendrachar, Asst. Director of Indology, Brahmna Literature, 2 Vol. (*i*) Jijhasadhikarana for Purely research work, begun in 4 years back, completed in 1952. (Philosophy of Brahman is the only source of knowledge. It is the only solution for all human problems.)

   (*ii*) Janmadhikarna. (The truth is that which is the source of all reality. It is therefore complete (purna). That is Brahman).

Central College, Bangalore

Physics

1. Kumari M. Leela, Government of India Senior Research Scholar,

   (*i*) Magnetism of pyrites, for Ph.D., begun in May 1950, completed in January, 1951. (Over 60 cystals have been studied. Groups of crystals are noticed in each of which there is a correlation between density and magnetic susceptibility.)

   (*ii*) Magnetism of amethyst, for Ph.D., begun in February, 1951, completed in October, 1951. (The colour of amethyst is studied from the point of view of magnetic properties.)

   (*iii*) Magnetism of tourmaline, for Ph.D., begun in October 1951, completed in December 1951. (The colour and magnetic properties of tourmaline show an interesting correlation.)

   (*iv*) Magnetism of some feldspars, for Ph.D., begun in January 1952, completed in September, 1952. (The magnetic properties are studied in relation to the crystal structure of potash and soda feldspars and in relation to scheen in moon stone.)

2. T. G. Shamanna, Government of India, Junior Research Scholar, (*i*) X.-ray study of the structure of silver Amalgams, begun in June, 1950, completed in October in 1951. Published in the form of a note in "Current Science" page 7, Jan. 1952, fuller paper is to be published.(The crystal structures of silver amalgams have been studied by X-ray powder and rotation methods. The amalgams have been prepared by various methods such as, direct mixing, electrolysis, boiling the metals in vacuo, and chemical action. They have also been studied by, varying the percentage of the constituent metals. Single crystals have also been investigated.)

(*ii*) X-ray study of the structure of copper and gold amalgams, begun in November 1951, likely to be completed in May, 1953. (Work on copper and gold amalgams is being done, more or less on the same lines as for silver amalgam.)

3. M. K. Subba Rao, Government of India Research Scholar, Power factor of indigenous dielectrics and porcelains, begun in June 1950, completed in March 1952 begun in March, 1952, likely to be completed in 18 months. (Power factors of indigenous dielectorns and porcelains made out of indigenous materials have been determined at audio and radio frequencies up to 100 Wc-s. and at temperatures from 20° to 200°C.)

4. Srimathi Y. V. Indira Bai, Mysore Government, Fellow Scholar, Spectrophotometry, begun in March 1951, completed in March, 1953. (Two Polarisation photometers and one photoelectric photometer with a two tube amplifying circuit are developed with the former, comparison photographs are taken and with the photoelectric photometer, the energy distribution in single spectral lines are studied.)

Mathematics

1. Prof. C. N. Srinivasaiengar, (*i*) Property of Scrolls, Published in Mathematics—Student Vol. XIX—March-June 1951. (The property proved is the following: The geodesic curvature of the Orthogonal trajectory and point of a generator is numerically equal to the asumptotic torsion multiplied by the tangent of angle between the tangent planes at the point and at the Central point.)

2. In collaboration Prof. B. N. Mukherjee of Calcutta, (*ii*) Normal linear complexes of a quadric surface, Published in *Math. student*, Vol. XIX. September-December (1951). (The equation of the linear complex of tangents to the twisted cubic through the feet of normals from any point to a quadric surface is worked out, and various properties are deduced, by the help of this equation.)

3. S. N. Manikarnikamma, Lecturer, (*i*) Note on Dr. Mishra's paper on a new expression for geoderic torsion, Carried out during the period of Research Fellowship of the Mysore University. *Mathematics students*-Vol. XIX, Nos. 1&2-March—June, 1951. (Gives an improved presentation of Dr. Mishra's results.)

(*ii*) Mean Conjugate lines on a surface, Published in *Journal of the Mysore University* Vol. XII, Part V—pp. 29 to 34, (October 8, 1951). (Studies the properties of curves on a surface whose tangents are parallel to the equiconjugate diameters of the indicatries at the corresponding points.)

(*iii*) On some properties of Enneper's Minimal Surface, Published in *Journal of the Mysore University* Vol. XII, Part IV—pp. 23 to 27. (The properties relate to the linear complexes associated with the asymptotic lines on the surface.

(*iv*) The second curvature of a geodesic in a hypersurface of a Riemannian space, Under publication in the *Proceedings of the Indian Academy of Sciences.* (This gives the generalisations of the concept and the formulae for geodesic torsion of a curve on a surface, with reference to curves on a Riemannian hypersurface.)

(*v*) Some properties of the skewness of distribution of the generators of a Ruled Surface. (Gives new expressions for the invarient known as skewness of distribution and studies some properties of this invariant.)

3. M. R. Lakshamma, Junior Research Scholar, (Government of India), (*i*) The Elliptic Function formulae and plane cubic curves, begun in 23rd August 1950, likely to be completed in 23rd August 1953. (In this paper the Geometrical interpretations of some of the Elliptic function formulae have been worked out.)

(*ii*) The Spherical cycloidal curve. (The Spherical cycloidal curve is given by r-ks where r is the distance from a fixed point and s is the arc length. Properties of this curve form the subject matter of the paper.)

4. T. S. Nanjundiah, Lecturer, (*i*) A note on an inequality of P. Turan for Legendre Polynomials, Carried out during the period of Fellowship, begun in June 1950, completed in July, 1950, Published in J. Mysore, Univ., 1950, Vol. 11 (*B*). (Alternative proofs and extensions of an inequality discussed by G. Szego (Vide Bill Amer. Math. Soc., 1948, Vol. 54, p. 401).

(*ii*) Inequalities concerning Beesel functions and orthogonal polynomials (jointly with V. R. Thiruvenkatacher), begun in September, 1950, completed in February, 1951, Published in Proc. Ind. Acad. Sci., 1951, Vol. 33 (A).(Single alternative proofs, sharpenings and extensions of results obtained by O. Szasz concerning ultrapherical polynomials and Beesels functions (*vide* Proc. Amer. Math. Soc., 1950, Vol. I, p. 256).

(*iii*) Certain summations due to Ramanujan and their generalisations, begun in October, 1950, completed in April, 1951, Published in Proc. Ind. Acad. Sci., 1951, Vol. 34 (A)—Read at the Indian Science Congress, January, 1951. (A simple derivation of four sets of summations generalising certain summations of Ramanujan and yielding several other allied summations.)

(*iv*) Techelyscheff Polynomials Tn (z) and Un (z), and functions of the second kind (jointly with B. N. Mukherjee), begun in May. 1951, completed in August, 1951, Published in Proc. Ind. Acad. Sci., 1952, Vol. 35 (A). (Expression of functions of the second kind in simple closed form—a result that appears to be new.)

(*v*) Sharpenings of some classical inequalities, begun in August, 1951, completed in November, 1951, In manuscript—Read at the Indian Mathematical Conference, December, 1951. (A new method of deriving some of the classical inequalities including those of Carleman and Hardy.)

(*vi*) Some generalisations of Mercer's Theorem, begun in January, 1952, likely to be completed by December, 1952, Under preparation, (Known generalisations due to Hardy of a well-known limit theorem of Mercer have been obtained alternatively under less stringent hypothesis. An attempt is being made to reach the most general form of Mercer's Theorem.)

Geology

1. Prof. L. Rama Rau, Head of the Dept. (*i*) More Dasycladaceae from the Niniyur group (Danian) of the Trichinopoly Cretaceous, completed in 1950, Published in Proc. Ind. Sci. Congress—1950. (The paper records the occurrence of abundant fossil algae belonging to the group Dasjclaceae in the rocks of the Niniyur group—Many of these types are different from those previously described.)

(*ii*) Some aspects of the Deccan Traps—a Review, ended in 1950, Published in Jour. Mys. Uni. 1950. (The paper embodies a critical review of the recent work on two aspects of the Deccan Trap formation: *viz.*, (*i*) the nature, distribution, and eruptive history of these lava flows, and (*ii*) the lower and upper age limits of this formation.)

(*iii*) Recent Discoveries of Fossil Algae in India, ended in 1952, Published in The Palaeo Botanist Birbal Sahni Memorial Vol. 1952. (The paper gives a review of the recent work done on fossil algae in India, together with references to similar work done outside. The interest and importance of further work on fossil algae in India is indicated.)

(*iv*) Scope for Foraminiferal Research in the Cretaceous rocks of S. India, ended in 1952, Published in Geo. Min. & Mett. Soc. Silver Jubilee Volume 1952. (After giving a brief summary of work done in the Cretaceous rocks of South India, the paper indicates further scope for research in this very important field of Micro-Palaeontology.)

(*v*) The East Coast Gondwanas and the problem of the upper age-limit of the Gondwana system, ended in 1952, Published in Contribution to the Symposium on "Stratigraphy of Gondwana land"—Lucknow, 1952. (A number of points have been raised for study and clarification regarding the upper Gondwana and associated rocks along the East Coast of S. India. The paper indicates the need to raise our whole outlook on the question of the upper age-limit of the Gondwana system.)

2. M. G. Chakrapani Naidu, Asst. Prof., (*i*) Stilpnomelane from Byrapur, Hassan District (Mysore State), begun in 1st week of June 1950,

ended in last week of June, 1950, Published in Current Science, Vol. 19 (July 1950), p. 208-9. (A peculiar micaceous mineral developing all along the contact of the Ultrabasics with the genisses near the Byrapur Chromite mines is identified as Stilpnomelane containing 47 per cent. (Fe, Mg, Mn)^{0} and 53 per cent. (Fe, A1)$2^{0}{}_{3}$. This is the first reported ocurrence of this mineral in Mysore.

(*ii*) Orthopyroxenes from Charnockites of Mysore, begun in October, 1950, ended in December, 1950, Published in Mys. Uni. Jour. Vol. XI, Part IV, Feb. 1951, p. 63 to 73. (A detailed optical and chemical investigation of the orthopyroxenes from the different types of charnockites is made. It is concluded that the orthopyroxenes from the ultrabasic types of charnockites are rich in En. ($MgSio_3$) molecule while those from the acid types are rich in of ($FeSio_3$) molecule ; that they do not correspond to clinohypersthene ; that they are secondary having been formed mostly from diopside with which they are associated ; and that they have really attained the orthorhombic symmetry during this conversion).

(*iii*) Ferrorichterite in the Chikkalavanchi area (Kolar Dist.), begun in March, 1952, completed in April, 1952, Under publication in Mys. Uni. Jour., (An optical-chemical study of a blue amphibole occurring in the quartz-spessartite rocks in the vicinity of the temple hill, △2472, Chikkalavanchi Village, Kolar Dist. is made and it is identified as Ferrorichterite. This is the first reported occurrence of this mineral in Mysore.)

(*iv*) Grunerites from Sakarsanhalli and Robertsonpet areas, Kolar District (Mysore State), begun in April, 1952, completed in July, 1952, Under publication in Mys. Uni. Jour. (A detailed optical and chemical investigation of grunerites from Sakarasanhalli and Robertsonpet areas is made. Adopting Sundius's Clarification they are classfied into manganese-rich and manganese-poor groups. Grunerites from Sakarsanhalli area are manganese-rich while those from Robertsonpet are manganese-poor.)

3. M. N. Viswanathiah, Lecturer, Kaemmererite from Hulikere Mines, Hassan Dist. Mysore State, Published in Current Science, Jan. 1951. Vol. 20, p. 15. (An attractive flanky mineral in association with chromite was found in Hulikere Chromite Mines, near Jambur, Hassan Dist. On chemical analysis showed of .06 p. c. of $Cr2^{03}$. On detailed optical properties identified as Kammererite, which was reported for the first time in India.

4. C. Gundu Rao, Government of India, Senior Research Scholar, Sedimentary Petrographic studies in some of the South Indian, Sedimentary formations, for Ph.D., begun in June, 1950, ended in June 1953. The following papers have been published.

(*i*) On the Upper Gondwana beds (Sriperumbudur and Satyavedu stages) near Madras—Jour. Mys. Uni. Vol. 11, 1951, P. VI, p. 79—88.

(*ii*) Some studies in the heavy mineral analysis of the upper Gondwana beds (Trichinopoly dist. S. India), Jour. Mys. Uni. Vol. 12, No. 2, p. 35-36, 1952.

(*iii*) Sedimentary petrography of the Gulcheru and the pulivendla quartzites of the lower cuddapah formations (Pre. cambrians) near Rayalacheruvu, Anantapur Dist. Madras, Under publication in Mys. Uni. Jour. completed in June, 1953. (The present problem was taken up for research as Government of India Senior Research training scholar. Considerable progress has been made in achieving results of correlative value. Work on coral reef limestones of the Trichinopoly cretaceous and the Dharwar rocks of the type area near Dharwar is in progress and the results will be published soon.)

Zoology

1. Prof. B. R. Seshachar, (*i*) The desoxyribonucleic acid content of the ciliate micronucleus. Published in Nature 165.848. 1950.

(*ii*) The nucleus and nucleic acids of *Chilodonella uncinatus* Ehrbg. Published in Jour. Expt. Zool. 114. 517. 1950.

(*iii*) The "degeneration" of the macronucleus during conjugation. Published in *Euclides* X. 345. 1950.

(*iv*) The macronucleus *Vorticella convalaria* during conjugation (with Mr. C.M.S. Dass.) Pnblished in Journ. Morph. 89, 187, 1951.

(*v*) The action of Perchloric acid on the ciliate nucleus. Published in Exp. cell Research.

2. C.M.S. Dass, Lecturer, at present I.C.I. Research fellow of the National Institute of Sciences of India, (*i*) Chromatin elimination in Glaucoma pyriformis (Ehrb.), Published in Nature (London), Vol. 165, 1950. Chromatin elimination in Glaucoma pyriformis (Ehrb.). (The process of elimination of chromatin material from the mecronucleus of *G. pyriformis* during binary fission has been described. On the basis of the observations it is suggested that the phenomenon of post-divisional chromatin elimination is a process of transference of surplus of desoxyribose nucleus acid present in the macronucleus back to the cytoplasm, where it is converted into the ribose form. Here the latter acts as a centre for protein synthesis in the newly formed individuals.)

(*ii*) Meiosis in two members of the family Nepidae, Published in Caryologia (Italy.), Vol. 4, 1951. (Meiosis in *Laccotrephes maculata* and *Ranatra elongata* shows the general pattern typical of Hemiptera-Heteroptera.

The diploid number of chromosomes in the forms studied is 43 (38 + 4X + Y) in the male. In the female of *L. Maculata* it is 46 (38 + 4X + 4X). In both, the sex complement consists of 4X and Y in the male. Two types of spermatids are produced; one with 23 (19 + 4X) and the other with 20 (19 + Y).

The ends of the autosomes during early prophase of meiosis are positively heteropycnotic and are directed towards the periphery of the nucleus.

The sex chromosomes are positively heteropyconotic during the prophase of Meiosis I. They form pseudo-quinquivalent during interphase. There is post-heterokinesis.

The centrioles behave precociously during meiosis.

(*iii*) Multipolar division in *Laccotrephes Maculata* Published in Proc. Indi.Sc., Congress, 1952. Meiosis in *Laccotrephes maculata* and *Ranatra elongata* shows the general pattern typical of Hemiptera-Heteroptera.

The diploid number of chromosomes in the forms studied is 43 (38 + 4X + Y) in the male. In the female of *L. Maculata* it is 46 (38 + 4X + 4X). In both, the sex complement consists of 4X and Y in the male. Two types of spermatids are produced ; one with 23 (19+ 4X) and the other with 20 (19 + Y).

The ends of the autosomes during early prophase of meiosis are positively heteropycnotic and are directed towards the periphery of the nucleus.

The sex chromosomes are positively heteropycnotic during the prophase of Meiosis I. They form pseudo-quinquivalent during interphase. There is post-heterokinesis.

The centrioles behave precociously during meiosis.

(*iv*) The Macronucleus of *Vorticella Convallaria* (Linn.) during Conjugation, for Ph.D., Published in Journal of Morphology, 1951, Vol. 89, The macronucleus of Vorticella convallaria (Linn.) during coujugation. (During conjugation in *Vorticella convallaria*, the macronucleus of both conjugants breaks up without a preliminary skein-formation. The fragments of the two conjugants are at first distinct but with the merging of the cytosomes their separate origin is lost.

The fragments give a brilliant reaction with Feulgen and methyl green throughout their existence.

By three nuclear divisions the synkary on produces 8 nuclei, 6 of which become the macronuclear anlagen while the other two form the micronuclei. They are distributed among the macronuclear fragments which often number 100. At first small, the macronuclear anlagen enlarge into spherical bodies of a diameter of 9. They are pale and negative to Feulgen, and methyl green .

Gradually, however, the macronuclear anlagen acquire DNA and accompanied by this is a diminution in the number of the fragments of the old macronuclei (of two conjugants which have fused together). A step-by-step increase in the staining reaction of the macronuclear anlagen and the decrease and final disappearance of the fragments can be traced. It is believed that this phenomenon provides the first available evidence of the derivation of the new macronucleus from that of the old.

(*v*) Studies on the nuclear apparatus of Peritrithous Ciliates, Part I, The Nuclear apparatus of *Existylis Articulata* for Ph.D., Multipolar division in I.accotrephes maculata Fabr. (While examining the history of chromosomes during spermatogenesis of *L. maculata* the author came across two cases of multipolar division. In one case there were 12 poles and in the other 8 poles. Both cells were in the I meiotic metaphase. It was not possible to make the exact count of the chromosomes ; however there were more than the diploid number (2n-43). It is believed that they have arisen by an arrest in the anaphase movement, and the formation of 'Restitution' nucleus. The precocity of the centrioles, a feature characteristic of the species, causes an improper nucleination of chromosomes and is responsible for their arrest in movement to the poles during anaphase. The author has discussed the method by which the two cases have arisen from a normal spermatogonial cell.

(*vi*) Amalrouneleate Conditions in *E. Articulata*, for Ph.D. Ready for publication.

(*vii*) Nucleic acids of *E. Articulata*, for Ph.D., Ready for publication.

(*viii*) Alkaline Phosphatases during growth 8 re-organization in *E. Articulata*, for Ph.D., begun in January 1953, In progress.

3. M. R. N. Prasad, Lecturer, (*i*) Changes in the reproductive Organs of the male palm squirrel Funambuls palmarum palmarum, Linn. begun in 1951, Published in J. Mys. Univ. Vo. 12, p. 89—105, 1951. (Animals with fully functional testes were found in all the months of the year. Spermiognic process is uninterrupted. The testes are not quiscent during any part of the year. The weight of the eprdidymis and that of the others accessory organs of reproduction and their growth are closely correlated with the growth and weight of the testes. The growth of the interstitial cells also follows closely the growth of the testes. The weight of the os pneis can be used to classify the animal as adults or young.

(*ii*) Male genital tract of the Indian squirrels, Reproduction of the Indian gerbit *Tatera indica*, begun in 1952, Published in Proc. Indian Science Congress. (In this paper the male genital tracts of three genera of Indian squirrels *Funambulus palmarum palmarum*, *Ratufa indica maxima* and *Petaurista phillipenis* are figured and described. The genital tracts of *Ratufa* and *Petaurista* conform in general to the normal Sciurid type. The tract of Funambulus palmarum palmarum does not show the presence of true Coweers glands bulbar gland and penile duct. The Coweers glands are in the form of parches of glandular tissue on either side of the urethra completely enclosed in the musculature of the bulb and their ducts open into the urethra in the bulb. While the tract of *F. p. palmarum* differs from this normal type that of the ground squirrel *Funambulus palmarum* described by Siddiqi is of the normal Sciurid type. The work emphasises the fact that the genital tract differs greatly in the forms now supposed to belong to the same genus—A comparative study of the male genital tracts of all the existing genera of Indian and Ceylonese squirrel is essential for a better understanding of their interrelationship and classification.

(*iii*) Habits, breeding Season and Placeutation of *Tatera indica*, for Ph.D., Published in Proc. Ind. Sci. 1953.

(*iv*) Follicular Atresea in the ovary of *Tatera indica*, for Ph.D., Published in Proc. Ind. Sci. Cong. 1952.

(*v*) Male genital tract of two genera of Indian Squirrels, Under Publication.

(*vi*) The early development and morphogenesis of the Foetal membrances of *Tatera indica*, for Ph.D.

4. M. R. Rajasckarasetty, Lecturer, Spermiogenesis and Enzyme Localization in the Crab, (Cytiology), begun in August 1952, completed in January, 1953. (By the recent advances in histochemistry it is possible to study the Enzymatic constituents of a cell. It is interesting to study the distribution of Mucopolysaccharides in the sperm of Crab, since, the structure of the sperm is very much different from the mammalian sperm. Much work is being done on the localization of Alkaline Phosphatases and their association with mucopolysaccharides. We are studying both these aspects in the Crab.)

(*ii*) Relation of Sperm Morphology to genotypically determined variations in fertiles. (Cytogenetics) begun in 1959, completed in 1951, Published in Proc. Exp. Biol & Med. Vol. 78—845—848. (A new type of quasi-sterility determined by the interaction of two factors tO&t3 was studied cytologically. It was found that most of the normal looking sperms were physiologically sterile. The importance of P.A.S. technique in understanding the alteration in the acrosome component of the sperm is stressed.)

(*iii*) Studies on a new type of genotypically determined quasi-stentity in the house mouse. (Cytogenetic) for Ph.D., begun in 1949, completed in 1952, to be published in the Journal of Fertility and Sterility California. (The effect of the interaction of the two factors tO & t3 was found to be on the production of significantly higher percent of morphologically abnormal sperms but there was no correlation between per cent. ages of sperm abnormality and degrees sterility. An account of the spermiogenesis of abnormal sperm is given.)

(*iv*) Non-Synchonous Segregation of chromosomes in the meicsis of house mouse. (Cytogenetics) begun in 1949, completed in 1952, Sent to Indian Science Congress 1952. (It is believed that synchonous segregation of chromosomes is the rule in the meiosis in the House mouse. Careful studies have shown that non-synchronous segregation is fairly common in all the genotypes studied.)

5. B. A. Gulam Ahmed, ♀ reproductive cycle in lorries bydekkeriams (Embryology), for D.Sc., begun in 1947, likely to be completed in 1953, (Historological changes in different parts of the ♀ reproductory complex with reference to different reproductory cycles are being studied. Specimens were collected over a period of 4 years and size and weight correlative in terms of oestrus and an oestrous period are also being studied).

6. M. Apparswamy Rao, M.Sc., Lecturer, Morphogenesis of Thymes in Vertebrates with particular reference to Anura, for Ph.D., begun in 1950, likely to be completed in June, 1953. One paper is sent for Publication. (The thymus is still an enigmatic organ. Contensions and controversies involve questions regarding its origin, structure and physiology.)

Many investigators are of the opinion that the thymus promotes growth and calcification of bones in early life. Others hold the view that it functions as a lymphoid organ in supplying lymphocytes and plasma cells to the blood stream. The fact that it remains throughout life and that it undergoes involution at puberty indicates its relationship with the gonads.

No conclusions have been reached regarding the origin of thymocytes, granulocytes, unicellular Hassall's corpuscles. Therefore it is interesting to study the morphogenesis of the thymus in Anura.

Progress.

(*i*) Morphogenesis of the thymus in Microhyla ornata.

(*ii*) Morphogenesis of the thymus in Bufo and Cacopus (in progress).

(*iii*) The histology and histochemistry of the thymus in Calotes (in progress)

7. M. D. Parthasarathy, Lecturer, Certain features of some South Indian Scorpians, Submitted in Partial requirement for the M.Sc., Degree as Thesis in 1935, begun in 1934, completed in 1935.

(*ii*) Coxal glands of Palamnaeus further elaborated, begun in 1951, completed in 1952, Published in Indian Science Congress 1952 Abstracts.

(*iii*) Observations on the Cytology of Thely Phonus indius, begun in 1951, completed in 1952, to be published in Indian Science Congress abstracts 1953.

8. B. N. Bole-Gowda, (*i*) The Chromosome study in the Spermatogenesis of two lynx Spiders (Oxyopidae), for D.Phil., begun in January 1950 completed in July, 1950, Published in Proc. Zool. Soc. Bengal, Vol. 3, 95—107, 1950. (The first three papers are based on the study on the chromosome morphology, their behaviour and the sex-determining mechanism in twenty-eight species of male spiders. This constitutes the thesis submitted to the University of Calcutta for the fulfilment of D.Phil Degree in July, 1952.)

(*ii*) Studies on the Chromosomes and the sex-determining mechanism in four hunting spiders (sparassidae), for D.Phil., begun in January, 1950, completed in December 1951, *Ibid.*, Vol. 5, 51—70 (1952). (The first paper (1950) describes the chromosome morphology and behaviour especially that of sex-chromosomes in two lynx-spiders. The occurrence of two types of sex-determining mechanisms—Xo and X_1X_2O types—in a family has been recorded for the second time. The origin of sex chromosomes in the Order Araneae has been discussed and an alternative hypothesis has been proposed for the origin and evolution of X-chromosomes in this group.)

(*iii*) Chromosome study in the meiosis of twenty two spiders, for D.Phil., begun in January 1950, completed in July, 1952, Ready for publication, (The second papet (1952) records the occurrence of metacentric X-chromosome for the first time in spiders in *Hieteropoda sexpunctata.*

Occurrence of peculiar "double-V" bivalents have been noticed in varying number in the species mentioned above. An opinion has expressed for their origin in meiotic studies. All the three types of sex-determining mechanisms—XO, X_1X_2O and $X_1X_2X_3O$—have been recorded in four species studied in the family Sparassidae. The probable evolution of X-chromosomes in *Heteropoda* spp. has been discussed. Chiasma frequency has been investigated in a few species.

(*iv*) Investigation on the Karyological studies in some spiders, begun in April, 1952, completed within six to seven months (1953). (The third paper is planned to ascertain the extent of cytological data which could help in the study of cytosystematics of this group. (The entire group, (Order : Araneae) is characterized by the presence of X_1X_2O type. Isolated instances of XO and X_1X_2O types have neen noticed in different families. The uniform behaviour of X chromosomes during meiosis and the chromosome number in a given family help us to a little extent in the cytosystematic study of this group.

A comprehensive data based on a large number species are necessary so as to come to a definite understanding of cytosystematic study of this group.

Botany

1. Dr. K. N. Narayan, Apomixis in species of *Pennisetum*, for Ph.D., Thesis of University of Califoria, 1951.

2. Dr. K. Subramaniam, (*a*) Development of embryo sac and endosperm in *Stylidium tenellum* Swartz, Published in Current Science 1950 : 19.

(*b*) Some phenological observations on *Dillenia indica*, Published in Jour. Bombay, Nat. Hist. Soc. 1950.

(*c*) Embryology of *Istoma fluviatilis*, Published in Proc. Indian Sc. Con. 1951.

(*d*) The origin and nature of haustoria in *Lobelia cardinalis*, L. Published in Botanical Gazette, 1951.

(*e*) A morphological study of *Stylidium gramminifolium*, Published in Lloydia, 1951.

(*f*) On the probable origin of the Unilocular ovary of the Compositae, Published in Proc. Indian Acad. Sci., 1951.

(*g*) Flower structure and seed development in *Isotoma fluviatilis*, Published in Proc. Nat. Inst. Sci., 1951.

(*h*) Interrelationships of Camapunlatae, Published in Journ. Mysore, Univ. 1951.

(*i*) Studies on the relationships of the Melastomaceae, Published in Jour. Mysore Univ., 1951.

(*j*) Embryology of *Oxyspora paniculata*, Published in DC. Phytomorphology, 1951.

(*k*) The nutritional mechanism of embryo sac—Campanulaceae, etc., Published in Proc. Indian Sc. Con, 1952.

3. K. Subramaniam and B.A., Razi, Some aspects of embryology of Dipsacaeae, Published in Proc. Indian. Sc. Con., 1951.

4. K. Subramaniam and A. Nagaraja Rau, The development of male and female gametophytes of Chlorophytum sp., Published in Proc. Indian Sc., Con. 1951.

5. K. Subramaniam and M. V. S. Raju, Circumscissile dehiscence in *Spheno colea zeylanica* Gaertn, Published in Current Science, 1952.

6. M. Anantaswami Rau, (*a*) Integumentary vascular tissue in *Cassia tora*, L., Published in Current Science, 1950.

(*b*) The suspensor haustoria in Crotalaria, Published in Annals of Botany, 1950.

(*c*) Development of embryo in *Trigonella* sp., Published in Jor. Ind. Bot. Soc., 1950.

(*d*) Endosperm in *Crotalaria*, Published in Current Science, 1951.

(*e*) Endosperm in *Rothia trifoliata*, Published in Annals of Botany, 1951.

(*f*) Development of embryo in *Aeschynomene indica*, Published in New Phytologist, 1951.

(*g*) Nutrition of seed of *Vigna catjang*, Published in New Phytologist, 1951.

(*h*) Development of embryo in some Papilionaceae, Published in Phytomorphology, 1951.

(*i*) Endosperm in some species of *Cassia*, Published in Svensk Bot. Tidsk, 1951.

(*j*) Endosperm in some Bapilionaceae, Published in Phytomorphology, 1951.

7. A. Nagaraja Rau, An embryological study of *Dioscorea* sp., Published in Current Science, 1951.

8. D. A. Govindappa,.(*a*) Contribution to life history of Klugia notoniana, Published in Proc. Ind. Sc. Congr. 1951.

(*b*) Life history of *Scilla indica*, Published in Jour. Mys. University, 1952.

9. M. V. S. Raju, (*a*) Embryology of Sabiaceae, Published in Current Sci., 1952.

(*b*) Embryology of *Anagallis Pumila*, Published in Proc. Indian Acad., 1952.

10. K. M. Safeeulla, Government of India Scholar, (*a*) The genus Albugo in India, Published in Science and Culture, 1952.

(*b*) Albugo species on *Ipomoea hederaceae*, Published in Current Science 1952.

(*c*) Morphological and cytological studies in Albugo species on *Ipomoea hederacea* and *Merremia*, Published in La Cellule (Belgium).

11. K. M. Safeeulla and M. J. Thirumalachar (*a*) A morphological and cytological study of Cystopus on *Mollugo*, Published in Phytomorphology 1951.

(*b*) Some new or interesting fungi III, Published in Sydowia (Austria), 1951.

(*c*) Some new or interesting fungi, IV, Published in Sydowia, 1952.

12. K. M. Safeeulla and H. C. Govindu, (*a*) Development of female gametophyte and endosperm in *Bacopa* sp, Published in Llloydia, 1950.

(*b*) Cintractia minor on the species of Cyperus in Mysore, Published in Current Science, 1951.

(*c*) Notes on two synchytrium spp., Published in Current Science, 1952.

Sanskrit

1. S. Rama Chandra Rao, M.A., Lecturer. (*i*) Story of Indian Literature, Published in Sarana Sahitya, July 1950.

(*ii*) Saraswathi , Published in Journal of Kannada Academy, 1950.

(*iii*) A few Dance patterns of India, Published in Vikrama Annual, 1951.

(*iv*) The Heroics of the plays of Kalidasa, Published in Transaction 7,—The Indian Institute of Culture, Bangalore.

First Grade College

Botany

1. Dr. C. V. Krishna Iyengar, Asst. Professor, (*i*) Intraseasonal Growth variation and cultivation of Sugarcane, begun in 1947, Published in Nature August, 1951.

(*ii*) Intraseasonal Growth variation and cultivation of Cotton, begun in 1947, and completed to be sent to the Indian Science Congress Session of 1953.

Geography

1. Dr. Ghouse Khan Ghori, Asst. Professor, Articles Published:

   (*i*) Coffee Plantation Industry in Mysore: Madras Geographical Journal 1952. begun in 1952, completed in February 1952, published in Madras Geographical Journal. (Coffee in Mysore state: Historical Economic and future of the Coffee Industry of Mysore. Agricultural and climate conditions dealt with in detail.)

   (*ii*) Ragi in India under Publication. (Distribution of Ragi Cultivation in India and particularly in South India its importance as a food crop in this Food deficiency period.)

English

1. C. N. Ramaswami Sastry, Lecturer, An article on Mark Twain as a Humonist: based on a Lecture delivered under the auspices of the U. I. A. A translation in Kannada has been published in Local Kannada Weekly. The English version will be sent to the Editor, Mysore University Journal shortly. (The article is one of a series aiming at a critical revolution of American writers likely to be appreciated in India.)

2. K. Krishna Iyengar, Lecturer (*i*) Bacon's Position in Science and Philosophy, [and completed in 1950, Published in Mysore University Journal, September, 1951.

   (*ii*) An Introduction to Bacon's New Atalantis and completed in 1951 Published in Mysore University Journal. Sept. 1951.

   (*iii*) Bacon's Map of Knowledge.

3. V. Puttamadappa, Lecturer, Articles Published:—

   (*i*) Henrik Ibsen, begun in 1951, Published in Modern Review, (Calcutta) (Ibsen:—A brief survey of Ibsen's Poetry and plays. His poetry preferred to his plays and why.)

   (*ii*) Modern Poetry, Published in Decca Herald Bangalore, (Modern Poetry: Characteristics of Modern Poetry; limitations and pitfalls; Some masters of modern poetry and short review of their works.)

   (*iii*) W. B. Yeats, Published in Deccan Herald, Bangalore. (W. B. Yeats—A short review of Yeats' poems. Yeats compared with the romantics.)

   (*iv*) Theatres: Old and New, Under Publication in Modern Review (Madras). (Theatres: An exhaustive study of the threatres old and new. From the amphitheatres down to the modern theatres. The merits and demerits of the two.)

4. H. H. Anniah Gowda, Lecturer (*i*) Eliot The Poet, Published in Journal of Mysore University. (Eliot's mental make-up. Critical estimate of his poetry.)

(*ii*) Medieval Ethic in Shakespeare, Published in Journal of Mysore University. (Background—Age Medieval Ethics and How Shakespeare made use of them in his dramas.)

(*iii*) More Revealations about Bowell, Published in Mysindia. (Bowell estimated as an essavist.)

(*iv*) New Verses Literature, Published in Mysindia. (The common elements between Journalism and Literature.)

(*v*) Hopkins and the New Metaphysicals, Published in Mysindia, Hopkins as a poet.)

(*vi*) Shakespeare Criticism, Published in Mysindia. (Revaluation of Shakespeare Criticism.)

(*vii*) A writer of Distinction, Published in Deccan Herald. (R.K. Narayan's work estimated.)

(*viii*) C. Day Lewis, Published in Mysindia. (His poetry evaluated.)

(*ix*) The Poetic Image, Published in Mysindia. (Imagery in Modern Poetry.)

(*x*) A Great Modern Critic, Published in Mysindia. (Criticism of F. R. Leavis evaluated.)

(*xi*) Stephen Spender, Published in Mysindia. (Discussion of Spender's Poetry.)

(*xii*) Modern English Poets (Kannada) a pamphlet. (Under the auspices of University Extention Lectures.)

Kannada

1. T. S. Shama Rao, Lecturer (*i*) Sukumaracharite by Shantinath Edited and Printed, Last form under print finished in 1950. (Edited with Introductions, notes, etc.)

(*ii*) Bharata Sangraha—Virataparva Edited and Printed, begun in 1950, completed in 1950 and Published, in T.S.V. Memorials. (Critical Edition—Abridgement, notes.)

(*iii*) Kuvempu natakagalu—printed and published, begun in 1949, and completed in 1952, Published in Prabhudha Karnataka. (Critical Estimate of Ratnakara of 1657.)

(*iv*) Jaimini Bharatha—Under print, and completed in 1951. (Abridgement of the classics with critical introduction and notes.)

2. G. Gundanna, Lecturer (*i*) Kavyadalli Santarasa begun in 1952, and completed, Published in Vokkaligara Patrike.

(*ii*) A critical Essay on K. V. Puttappa's "Pakshi" and completed, to be published in (Kavidarasana shortly). (2, 3, 4—These to be shortly published in a new citical work " KAVIDARSHANA ")

(*iii*) An introductory Essay on K. V. Puttappa's " Pakshi Kashi " and completed, to be published in (Kavidarasana shortly.)

(*iv*) A critical Essay on " Bha Palguna Ravi dharasanake " of K. V. B. to be published in Kavidarsana.

(*v*) Several Lyrics, and completed, Published in Vokkaligara patrikete.

3. G. S. Sivarudrappa, Lecturer (*i*) Published a book of Poems by name " Samagna."

(*ii*) A critical Essay on Kuvempu's ' Hasiru ".

(*iii*) Some stories in " Nandini " monthly.

(*iv*) Poems in Prabudhakarnataka.

(*v*) An Essay on Poetry in " Janapragathi."

(*vi*) Criticism in Prabuddakarnataka.

First Grade College, Tumkur

Political Science

1. T. S. Narayana Rao, Asst. Prof. Union-State Relations in India under the constituton, Fellowship Thesis, begun in September, 1949 completed in February, 1952. (A critical exmination of the relations, Legislative, Administrative and Financial—betweem the Union and the States under the terms of the Constitution (1950) in the light of the experience of other Federations like the U.S.A. Australia and Canada. It is shown that the relations are more Unitary than Federal with a pronounced bias towards a strong centre. Future trends are indicated.)

History

1. B. S. Krishna Swamiengar, Asst. Prof. (*i*) Administrative Experiments of the British in India in the 18th and 19th century Published in Mysore University Journal 1950-51.

(*ii*) Why Sirajuddaulal hated the English?, Published in Mysore University Journal 1950-51.

(*iii*) An Experimental Period in the History of the British in India, Published in Mysore University Journal 1950-51.

(iv) Sirajuddaulah and His Times, completed in November, 1952, (A critical study of the European sources (English, French and Dutch) to show that Sirajuuddaulah was not after all a monster of cruelty and if anything he had determined to free the country from the yoke of foreigners.)

(v) Cultural and political History of the Hoysalas, completed in November, 1951. (For the first time, a complete account of the Hoysalas is given based on original sources.)

Kannada

1. C. Mahadevappa, Lecturer, A critical Edition of Bhavachintaratna is being carried on, and the text portions is printed, begun in for the last 4 years, to be completed by the end of December, Published at Panduranga Press, Tumkur).

NAGPUR

Biochemistry

1. Prof. M. C. Nath, Head of the Depart. and V. G. Hatwalne, Research Fellow, Effect of acetoacetic-a-cid on reduced glutathione content of blood in rabbits, for Ph.D., Published in Nature, Vol. 166, p. 692 (1950). (Sod. acetoacetateredu ces blood glutathione of rabbits when injected intraperitoneally.)

2. Prof. M. C. Nath, and C.H. Chakrabarti, Lecturer, (*i*) Progressive decreased glucose-tolerance and glycogen-storage following acetoacetate injection ; prevention by insulin and amellin, for Ph.D., Published in Proc. Soc. Exp. Biol. and Med. (New York), Vol. 75, p. 326, (1950). (Amellin has been found to restore glycogen and glycose tolerance of animals depleted by continuous inj. of sodium acetoacetate in a better way than with insulin.)

(*ii*) Acetoacetate induced changes in bloodlactic and ascorbic acid and their prevention by insulin and amellin, for Ph.D., Published in Proc. Soc. Exp. Biol. and Med. (New York), Vol. 78, p. 369, (1951). (Sodium acetoacetate injected animals show more blood lactic acid and less ascorbic acid than control animals. Amellin checks the excessive accumulation of latic acid in a better way than with insulin.

(*iii*) Disturbance in the balance of hepatic glycogenesis and glycogenolysis by intermediary fat metabolites and its restoration, for Ph.D., Published in Ind. Jour. Physiol and Allied Sc., Vol. 5, p. 43 (1951). (Enormous depletion of liver and muscle glycogen has been observed in rats receiving continuous injection of sodium salt of B-hydroxybutyrate. There is simultaneous increase of lactic acid in liver and muscle. Amellin treated animals do not show any such deleterious effects.)

3. Prof. M. C. Nath, and B. Belavady, Research Fellow, Acetoacetate induced changes in blood urea, inorganic phosphate and cholesterol and prevention by insulin and amellin, for Ph.D., Published in Indian. Jour. Physiol and Allied Sc., Vol. 5, 139 (1951). (Sodium acetoacetate injected rabbits show more blood urea inorganic phosphate and cholesterol than control animals Amellin prevents their excessive accumulation in blood.)

4. Prof. M. C. Nath, and V.K. Sahu, M.Sc., Government of India Senior Research Scholar, (*i*) An insight into the role of glucose in ketolysis, for Ph.D., Published in Science and Culture, Vol. 17, p. 386, (1952). (A definite metabolic relationship between glucose and acetoacetate has been observed to exist in the living body.)

(*ii*) Metabolic relationship between acetoacetate and glucose, for Ph.D., Published in Proc. Soc. Exp. Biol. and Med., Vol. 79, p. 608, (1952). (Glucose has been found to help ketolysis. This experiment has been performed on rabbits.)

5. Prof. M. C. Nath, and J. S. Gadgil, Laxminarayan Research Fellow, and Dr. S. Pontremoli, M. D. University of Genoa, Effect of amellin in the prevention of fatty infiltration in the liver, for Ph.D.,

Published in Nature, Vol. 169, p. 711 (1952). (Amellin, the anti-diabetic principle, has been found to prevent fatty infiltration in the liver.)

6. Prof. M. C. Nath and R. P. Chitale, Chitnavis Research Fellow, and B. Belavady, Chitnavis Research Fellow, Studies on the biosynthesis of vitamin C and a new precursor, for Ph.D., Accepted for publication in Nature (London). (Condensation product of glucose and acetoacetate has been found to accelerate enormously the biosynthesis of vit. C. in germinating legumes.)

7. Prof. M. C. Nath, and V. G. Hatwalne, I. C. M. R. Research Fellow and J. S. Gadgil, M.Sc., Laxminarayan Research Fellow, The progressive depletion in the reduced glutathione content of the blood following acetoaceate injections, for Ph.D., Accepted for publication in Biochemical Journal (London). (Rabbits receiving continuous inj. of sod. acetoacetate show progressive decrease of blood glutathione.)

8. Prof. M. C. Nath and J. S. Gadgil, Laximinarayan Research Fellow and V. G. Hatwalne, Reseach Fellow, Studies on alloxan diabetes, Increase of susceptibility caused by acetoacetate, for Ph.D., Accepted for publication in Biochemical Journal (London). (Rabbits injected with sod. acetoacetate become more susceptible to alloxan diabetes. Acetoacetate treated animals require less alloxan for the development of diabetic symptoms than untreated animals .)

9. Prof. M. C. Nath and V. G. Hatwalne, I.C.M.R., Research Fellow, Effect of acetoacetic acid on succinic oxidase activity, for Ph.D., Communicated for publication. (Sodium acetoacetate inhibits the activity of succinic oxidase of rat liver. Glutathione has been found to protect the inhibition of oxidase by acetoacetate.)

10. Prof. M. C. Nath and V. K. Sahu, Government of India, Senior Research Scholar, and R. P. Chitale, Chitnavis Research Fellow, Role of acetoacetate in aggravating the disturbance in the carbohydrate metabolism of Scorbutic animals for Ph.D., Communicated for publication. (The depletion of liver and muscle glycogen in scorbutic guineapigs is very much aggravated by acetoacetate inj. Acetoacetate has been shown further to develop hyperglycemia rapidly in scorbutic animals.)

11. Prof. M. C. Nath and B. Belavady, Chitnavis Research Fellow, V. K. Sahu, Senior Research Scholar and R. P. Chitale, Chitnavis Research Fellow, On the biosynthesis of Vitamin C, for Ph.D., Communicated for publication. (The condensation product of glucose and ethylacetoacetate has been found to be a new precursor of vitamin C.)

12. Prof. M. C. Nath and V. K. Sahu, Senior Research Scholar, Some further insight into the nature of the metabolic relationship between glucose and acetoacetate, for Ph.D., Communicated for publication. (Condensation product of glucose and ethylacetoacetate on oxidation by alkaline hydrogen peroxide gives a new ketone, semi-carba-zone

which has m. p. 248°C. On acid hydrolysis, the cond. prod. gives one reducing sugar, acetone and C02.

13. Prof. M. C. Nath and C. H. Chakrabarti, Lecturer in Biochemistry, Studies on the effect of acetoacetate and B-hydroxibutyrate on vit. B1, both in vivo and in vitro, for Ph.D., Communicated for publication. (Sodium acetoacetate has been found to destroy vit. B1 both in vitro and in vivo. Rabbits receiving injection of sod. Salt of acetoacetate and B-hydroxybutyrate show more pyrivic acid in blood and urine.)

Geology

1. Sripadrao Kilpady, Head of the Deptt., (*i*) " A tourmaline Pegmatite from Koradih, C. P." Published in Proc. Ind, Sci. Congr. 1951. (Describes the occurrence of two generations of tourmaline crystals—one prior to intrusion and due to conversion of the liotite and the second postintrusive and derived from the felspars in a pegmatite from Koradih, C. P.)

   (*ii*) " A giant Pelecypod from the cretaceous rocks of Trichinopoly," Published in Proc. Ind. Sci. Congr. 1952. (A most interesting and unusual discovery of a giant pelecypod from the cretaceous rocks near Sillakudy, Ariyalu Dt. The shell is 17" long 22" high and 10" thick and represents a lizane type which evolved and became extinct the cretaceous.)

Luxminarayan Institute of Technology

Chemical Engineering

1. Prof. U. R. Warhadpande, Dr. P. S. Mene and Dr. S. A. Sletore, Destructive distillation of some Central Provinces Woods, Published in J. S. I. R.—1950, V. 9B, No. 9 pp. 234—236.

2. Dr. S. A. Saletore, Dr. P. S. Mene, and Prof. U. R. Warhadpande, Solvents for the extraction of Acetic Acid from Pyroligneous liquors, Published in Indian Institute of Chemical Engineers Vol. II, December, 1950.

3. Prof. U. R. Warhadpande and Dr. P. S. Mene, Pyrolysis of Wood.

4. Prof. G. Narsimhan and Dr. P. S. Mene, A note on Edward Johnston's nomographic chart for fractionating column calculations, Published in Tr. I. I. Chem. E. 1951.

5. S. C. Sane, M. K. Shirpurkar, V. V. Deshpande and Prof. M. S. Telang, Kelly tube for sedimentation analysis, Published in Anal. Chem. 22, No. 4 pp. 617 (1950).

6. V. V. Deshpande and Prof. M. S. Telang, Pipet method of sedimentation analysis by rapid determination of distribution of particle size, Published in Anal. Chem. 22, No. 6 pp. 840, (1950).

7. Prof. G. Narsimhan and Dr. S. A. Saletore, (*i*) Stability of Oil Varnish Emulsions, Published in Journal of Scientific and Industrial Research.

   (*ii*) Determination of total Lead in Paint material, Published in J. Ind. Chem. Sec. (Ind. News Edn.), XII, No. 2 and 3, pp. 138—147 (1950).

8. V. V. Deshpande and Prof. M. S. Telang, Rapid sedimentation Analysis with Kelley Tube, Published in Anal. Chem., 1952, Vol. 24, pp. 885—887.

9. Prof. U. R. Warhadpande and Dr. P.S. Mene, Dephlegmation of Wood distillation Vapours, Published in Jour. Sci. Ind. Research 11,33, (1952).

10. S. B. Pandya, Studies on M. P. Coals, for M.Sc., (Tech.)- (thesis),

11. V. V. Deshpande, Particle Size determination, for M.Sc. (Tech.)-(thesis.)

12. S. S. Thakur, Utilization of Red-Mud, for M.Sc. (Tech.)-(thesis.)

Applied Chemistry

1. Prof. S. N. Behere, Reaction between Nitric Acid and Benzene—a preliminary kinetic study, Published in J. I. C. S. Ind. and News Edn. Vol. 13 (1950), pp. 45—54, June 1950.

2. Dr. T. N. Mehta, Prof. C. V. N. Rao and P. Sen, Behaviour of certain Edible Oils in the Frying Pan, Published in Indian Soap Journal 1951, Vol. 17, p. 107.

3. Dr. T. N. Mehta, Chemistry of Fatty Acids, A review of recent research work, Published in Indian Soap Journal 1952, Vol. 17, page 201.

4. P. Sen, Isomerisation and polymerisation of Oils, for M.Sc. (Tech.)-(thesis).

5. V. N. Gavai, Autoxidation and Rancidity of Oils, for M.Sc. (Tech.)-(thesis).

Political Science

1. S. G. Kashikar, Lecturer, The Condition of Indians abroad Politics, for Ph.D., begun in 1950, likely to be completed in 1954. (The study includes the origin and nature of Indian emigration during the British period; the economic, poltitical social, educational, etc., condition of the Indian settlers abroad ; their difficulties ; the racial conflict ; policy of the Government of India (British.)

Anthropology

1. M. P. Buradkar, Lecturer, 'Social Organisation of the Gonds in the Central Provinces,' for Ph.D., completed in August 1951, The thesis was approved and the degree of Ph.D., was conferred in

April 1951, Published in parts— (*i*) Nagpur University Journal, Nagpur. (*ii*) Man in India Ranchi. (*iii*) Journal of Indian Anthropology, Calcutta. (The Gonds and their habitat. Social structure of the Gond Community, Clan Organisation, Totemism, Kinship, Exogamy, Marriage, Class and Castes and the problem of Culture contact, have been studied.)

(*ii*) Gond Religion, for D.Litt., begun in 1951, likely to be completed in 1954. The study includes the following :—Socio-cultural stage of the Gond Community; The concept of Supernatural; Gonds and Godlings ; Rituals and Festivals ; Magic and Witchraft ; The Great crises ; The cult of the Departed and Nature of Gond Religion).

Training College

Social Psychology

1. R. V. Dakshindas, An investigation into the antisocial behaviour of school children, for M.Ed., begun in March, 1951 completed in March, 1952.

Education

1. M. Varma, "A Predictive Battery of Tests of Differential Scholastic Aptitude", for Ph.D., Begun in April, 1951.
2. S. N. Tamhane, A Study of Gifted Children, for Ph.D., begun in April, 1951, completed in January, 1953.
3. R. S. Muley, An investigation into the causes of failure of school children, for M.Ed., begun in 1950, completed in March 1952.
4. G. A. Puranik, A study of Extra curricular activities in secondary schools in Nagpur, for M.Ed.
5. Dina M. Pavri, Attitude of School children towards punishments, for M.Ed., and completed in March 1952.
6. G. B. Kothekar, Investigation into the Physical measurement of secondary school boys between the ages 10 to 16, for M.Ed., and completed in 1952.
7. J. S. Verhadkar, The problem of absence in secondary schools, for M.Ed., and completed in March, 1952.
8. K. K. Sharma, Critical Analysis of Children's literature in Hindi (up to the age of 10 years only), for M.Ed., and completed in March 1952.
9. K. G. Tak, A study of friendships and quarrels among children, their nature and factors contributing them, for M.Ed., and completed in March 1952.
10. M.R. Deshmukh, The effect of Material on memory as in the age group 10—14, for M.Ed., and completed in March, 1952.

11. N. N. Bhide, The Educational Sociological significance of the Vedic Samskaras, for M.Ed., and completed in March 1952.

12. P. R. Richharia, Home environment as a factor in scholastic attainment, for M.Ed., and completed in March, 1952.

13. Kumari Shanta Manapure, A study of hobbies of girls (8 to 15), for M.Ed., and completed in March, 1952.

14. Kumari Sumati Kapoor, Oral and written questions in the study of History, for M.Ed., and completed in March, 1952.

15. T. B. Ekbote, Financing of secondary education in M. P. for M.Ed., and completed in March, 1952.

16. Usha Hazarnavis, An observational study of social and emotional life of children between the ages 3 to 6, for M.Ed., and completed in March, 1952.

17. V. G. Bhodvaidya, A study of errors in Geography in Secondary Schools, for M.Ed., and completed in March, 1952.

18. Y. N. Sadaphal, A critical study of subject location in the scheme of work of schools for boys and girls in Nagpur, for M.Ed., and completed in March 1952.

College of Agriculture

Agronomy

1. D. G. Dakshindas, Lecturer, Studies in the Associated growth of cereals and legumes, for Ph.D., begun in 1951-52.

Agricultural Chemistry

1. D. K. Ballal, Lecturer, A study of erodibility of typical soils of Madhya Pradesh in relation to their physical and chemical characteristics, for Ph.D., begun in 1951-52.

College of Science

Chemistry

1. Dr. K. Krishnamurti, (*i*) Adsorption Isotherm, begun in 1950, Published in Proc. Indian Academy Science (1951). Further work both theoretical and experimental is being carried out, (A new equation for adsorption was derived and its applicability to adsorption processes is indicated.)

   (*ii*) Studies in Adsorption of Bacteria—Part I—(with S. V. Soman), begun in 1950, Published in Proc. Indian Academy of Sciences, (1951). Further work is being carried out. A few papers are to be communicated shortly. (Adsorption of B. Subtilis and B. Coli by Kaolin and charcoal was quantitatively investigated and the curves interpreted thoretically.

(*iii*) Changes in Electrical conductivity during Bacterial growth (with S. R. Kate), begun in 1951, Published in Nature, July, 1951,- Further and extensive work has been carried out on this subject, To examine the changes taking place in the medium during Bacterial growth.)

(*iv*) Mechamism of Mutual coagulation of colloids (with N. V. Karbelkar), begun in 1950, ended in April, 1952, Published in Science and Culture, 1951 and 1952. (To throw light on the mechanism of the mutual coagulation of colloids by the study of various physico-chemical properties during the process of coagulation.

2. N. V. Karbelkar, with Dr. K. Krishnamurti, Principal, (*i*) Mechanism Mutual Coagulation, For Ph.D., begun in 1940, completed in December, 1952, A note on efficiency of adsorbed ions as coagulators published in Science and Culture June 1951. (From the variations in various physical measurements during the process of mutual coagulation a theory of mutual coagulation and its Kinetics have been worked out).

(*a*) Viscosity (*b*) Surface tension (*c*) Conductivity (*d*) Thermal change (*e*) Volume change (*f*) influence of dilution, dialysis and tem. on rate and range (*g*) light absorption (*h*) Kinetic of mutual coagulation (*i*) effect of adsorbets on mutual coagulation have been studied.

(*ii*) Mutual interaction of emulsions and sols. (A note on Mechanism of Mutual Coagulation of sols published in Science and Culture June 1952.)

3. S. V. Soman, Lecturer with Dr. K. Krishnamurti, Principal, Adsorption in bacterial system, (*a*) adsorption of Bact. begun in April, 1949, completed in August, 1950. One paper published on adsorption of bacteria on charcoal and (*i*) Kaolin in Proc. Ind. Acd. Sci. Vol. 34, No. 2, Sec. B, 1951, Adsorption Adsorbent of Bact. on adsorrcent like charcoal and Kaolin was studied quantitatively. Adsoption curves were 'S' shaped. Fit in Krishnamurti's equation *viz.*— $a=\frac{K}{1+\propto e}-BC$ adsorption was specific separation of different bacteria possible.

(*b*) Adsorption of dyes by the Bacteria, begun in 1950, likely to be completed by 1955, adsorption isotherms were found out variation in S. T. during adsorption was studied.

4. G. V. Asolkar, Lecturer (*i*) Vapour phase chlorination of organic compounds, for Ph.D., begun in 1949, Published in J. Ind. Chem. Soc. 23, 52 (1946), Proc. Ind. Sci. Congr. Chem. Sec. 1949, Vapour phase chlorination of various organic vapours have been carried out with and without irradiation ; with and without silent electric Discharge.

(*ii*) Chlorination of organic compounds under silent Electric discharge, published in Curr. Sci. 20. 182-183, (1951), completed in December

1952. Extensive studies of Joshi effect in organic vapours under x-rays and its magnetic analogue discovered here have been completed. Results have been published in Nature (London) and 4 more papers are in course of publication. A new theory of Joshi effect has been put forward.

(*iii*) Studies in the Electrical Discharge through organic vapours with x-ray irradiation and action of magnetic field: published in Nature 168, 1006—1007 (1951), and in 169 (1952)

Studies of Joshi effect under x-ray B-rays and its magnetic analogue. Published in Proc. Ind. Sci. Cong. 1950, 1951 and 1952.

5. E. R. Talaty, Lecturer, (*i*) "Knietics of the Reaction between Iodine and Malonic Acid," for Ph.D., "Electrodeposition of Metals from Fluoride Solution" begun in 1949, completed in 1950, Published in Journal of Indian Chemical Society No. 12, 1951.

(*ii*) "Electrochemistry of Fluoride solutions Parts I—III published. Parts IV and V deal with cadmium and tin fluoride solutions, begun in April, 1950, likely to be completed by July, 1953, Parts I, II and III published in Jn. of Ind. Chem. Soc. jornal Nos. 8, 9, 1951 and No. 3, 1952 respectively. A study of potentials and conditions required for the deposition of metals from fluoride baths.

Physics

1. M. R. Bhidey, Lecturer (*i*) Studies of Joshi effect in mettallic vapours under x-rays, for Ph.D., begun in 1949, completed in 1952, Published in Nature (Lond.), 168, 1006, (1951). (Dual action of external radiations on the discharge, *viz.*, initiation of a self-maintained discharge and a partial suppression of the discharge current in a pseudo-continuous discharge has been established in various types of electrical discharges through gases and metallic vapours. The current strctures of the oromiscs discharge current and current especially the h.p. current pulses have been intensively studied and a new mechanism for the production of current pulse is proposed.)

(*ii*) Magnetic analogue of Joshi effect in various types of dischrage, Published in Proc. Ind. Sc. Cong. Phy. Sec. 1950, 1951, 1952, and Jn. Nature 169, (1952).

2. V. G. Bhide, Lecturer, Studies in the electrical discharge through gases and the influence of x-ray irradiation, radio active emanations and magnetic field on the discharge characteristics, for Ph.D., begun in 1949, completed in December, 1952, Published in Curr. Sc. (India), 20, 1878 (1951), Nature (Lond.) 168, 1006, (1951) and Nature 169, (1952). (Extensive studies of Joshi effect in halogens under x-rays in all types of discharges tubes especially, the cylindrical corona, maze counter type tubes, etc., have been completed.)

Joshi effect and its analogue under magnetic field, Published in Proc. Ind. Sci. Congress Phys. Sec. 1950, 1951, 1952. (Magnetic analogue of Joshi effect discovered here has been studied in various systems, excited by alienating and unindirectional potentials.)

A new theory of oromisc discharge and the associated Joshi effect has been proposed (Curr. Sec. 1951.)

Zoology

1. N. Owers, Lecturer in "Cytochemistry of the placentae of Mammals," for Ph.D., Begun in 1949, likely to be completed in in July, 1953, One part was published in Proceedings of the National Institute of Sciences, India Vol. XVII, No. 6 1951. " Studies on the cytochemistry of the placenta." Part II and III were read at Indian Science Congress Meetings in 1950 and 1951, abstracts were published in Proceedings of Ind. Sc. Con Part III. (The placenta is the organ of nutrition for the foetus in mammals. From it the foetus receives its requirements of iron, glycogen, liquids, enzymes, etc. The localization of these in the different cellular constituents of the placenta during the various stages of gestation has been studied in the blind mouse, (Crocidura Caerulea). The functional inter-relationships of the various cellulacomponents of the placenta and their contents is described.

Nagpur Mahavidyalaya

History

1. Dr. H. N. Sinha, Principal, Development of Indo-Islamic Polity. A study in the evolution of State in Medieval India, begun in 1946-47, ended in 1952. (A critical review of the functions of the state in Medieval India.)

Prakrit

1. Dr. H. L. Jain, Professor Edition and Translation of:— (*i*) Shatkhandagama Vol. IX, (*ii*) Tilota-Pannatti Vol. II. Published in 1950, Sholapur and 1951, Amraoti, Jain Philosophy and Chronology.

Sanskrit

1. S. P. Chaturvedi, Professor, Paninis' Vocabulory and his date, published in Siddeshwar Varma, commemoration Vol. Part II Oct. 1950 (Punjab).

2. Dr. V. W. Karambelkar, Lecturer, (*i*) Brahman and Purohit, Published in 1950 Calcutta Indian Historical Quarterly.

   (*ii*) Magic Ritual in Sanskrit Fiction, Published in 1950-Allahabad Journal, Janganath Jha, Institute.

   (*iii*) Problem of Nagarjum Published in 1952-Trivandrum Journal of Indian History.

   (*iv*) Nababa Khana Khanacharitam, Published in 1952-Banaras Nagari Pracharini Patrica.

   (*v*) Atharva-veda and Ayurveda, for D.Litt., begun in 1951, completed in 1953. (This is a work covering the History of

India Medicine from the vedic period to charaka special emphasis is laid on the Medical charms of the Atharva-veda. It deals with Medical tradition and Particular diseases mentioned in the Atharva-veda.)

Marathi

1. Shrimati K. Deshpande, Asstt. Professor, The first Century of the Marathi Novel (1850—1950), begun in 1946, completed in 1951. (A critical History of the Marathi Novel since its beginning in 1850, expected to be a volume of about 500 pages.

2. Dr. V. B. Kolte, Asstt. Professor (*i*) Chakradhara and Dnyaneshwar, begun in 1949, completed in 1950, Published in October 1950 by Marathi Grantha Sangrahalaya, Bombay. (Critical study of the work of these two Social and religious Saints.)

(*ii*) Sthan Pothi, begun in 1950, completed in 1951, Published by Arun Prakashan in 1951. (Unpublised Mahanubhou Ms. of 14th Century giving the topography at Mahanshaan in the 13th Century in the form of descriptions of places visited by Chakradhar.)

(*iii*) Life of Chakradhara, begun in 1951, completed in 1952, (Critical life sketch of Charkradhar written from original Mss.)

(*iv*) Sahyadrivarnan, begun in 1950, completed in 1951, Press copy ready cannot be published for want of Funds. (An unpublished Mahanubhou Poem of 14th Century.)

Urdu

1. S. Rafiuddin, Lecturer, Natia Shaniiin Urdu, for Ph.D., begun in 1946, completed in 1953. (Critical study of the Natia Poetry, Urdu literature. (It gives the development of Natgari in different form with special reference to Natia Mathnavi. It is estimated to be a volume of about 350 pages.)

Political Science and History

1. A. Avasthi, Lecturer " District Councils and Local Boards in M. P. (1861—1947), for Ph.D., and likely to be completed by the end of 1953, The development and working of the District Councils and Boards in M. P. 1861—1947.

Edition of Elphinstone correspondence (1804—1808), and completed 1952. I have in collaboration with R. M. Sinha edited the correspondence of Mountsturt Elphinstone, resident of the Count of Nagpur, 1804—1808.

Vidarbha Mahavidyalaya, Amravati

Botany

1. Dr. R. L. Nirula, Principal, (*i*) Guided the research work of V. R. Dnyanasagar who has done the following research work for the

Ph.D., Published in the proceedings of the Indian Academy of Sciences Vol. XXXIV 1951.

(*i*) Embryological studies in the Leguminosae.
(*ii*) Embryological studies in the Leguminosae.
Sent for publication to the proceedings of the Indian Academy of Science.

(*iii*) A contribution to the Embroyology of Pithecolobium saman Benth. Syn. Enterolobium Saman Prain.

(*iv*) A contribution to the Embryology of Neptunia triquetra Benth.

Zoology

1. E. N. Das, (*i*) " On a new species of Apororhynchus from the white Scavenger Vulture, Neophron percnopterus (Linn) from India."

   (*ii*) " On a new species of Acnathocephla of the Mediorhynehus (Van Cleave, 1916), from India.

   (*iii*) A paper on Development of a helminth parasite of the order Palaeacantho cephala, Sent for publication to the Records of the Indian Museum, Zoological Surevy of India.

   (*iv*) On some new species of the Genus Centrohynchis Records of the Indian Museum.

Mathematics

1. Y. V. Thosar, " Some simple relations involving Legendre's Functions $P^m_n(z)$ and $Q^m_n(z)$.

Chemistry

1. B. R. Deoras, On ' Anodic oxidation of the Formate ion ' Published in June 1951 issue of the Journal of the Indian Chemical Society.

History

1. P. S. Telang, Financial System of the Marathas, Published in V number of the annual Bulletin of the N. U. Historical Society.
2. Dr. V. R. Deoras, A paper on Govinda III—a great Rashtrakuta Emperor, Sent for publication in the Bulletin of the N. U. Historical Society.

Shri Shivaji College

Economics

1. P. J. Jagirdar, Social, Political and Economic thought of Mahadeo Govind Ranade, for Ph.D., begun in 1947, completed after two years, (Ranade's contribution in Social, Economic and Political field are being

compared with other thinkers and his debt to his predecessors and his influence on his successors are being evaluated.)

2. W. S. Kale, Lecturer, (*i*) Sales Tax in different Provinces of India, begun in May, 1951, completed in Agust, 1952, Being published in Udyam Marathi Magazine from Nagpur. (Origin of Sales Tax in In India, its spread, its peculiarities and salient features in difference Provinces.)

   (*ii*) Economic development of Madhya Pradesh with special reference to industries, begun in August, 1952, likely to be completed in December, 1953. (Industrial Development in Madhya Pradesh, peculiarities of Economic Development origin and growth of various Industries. Future Scope for Eco. Development of Madhya Pradesh.)

OSMANIA

Sociology

1. Narayan Singh Hazare, "Bhils of Aurangabad" for Ph.D., begun in November, 1950, and in progress.
2. Purshottam Sirsalkar, Some aspects of the Tribal Culture of Hyderabad, for Ph.D., begun in November, 1951, and in progress.
3. R. Prakash Rao, The " Lambadas " for Ph.D., begun in November, 1950, and in pogress.
4. Tulja Ram Singh, The " Madigas "—A Socio-economic Studies, for Ph.D., begun in November, 1951, and in progress.

History

1. R. Narasimha Rao, History of the Northern Circars 1500—1800, for Ph.D., begun in November, 1951, and in progress.
2. Shrimati Sarojini Regani, Teacher, Nizam's British Relations during the period 1824—1936, for Ph.D., begun in November, 1951, and in progress.
3. Shrimati Sukanya Ambiah, Early Deccan Polity upto 1400 A. D., for Ph.D., begun in November,1951, and in progress.
4. S. Natarajan, Teacher, The Rule of Law in Indian Administration for Ph.D., begun in November 1951, and in progress.
5. Shrimati Vaidehi, Teacher, Social and Cultural Life in Easterm Deccan upto 1350, A. D., for Ph.D., begun in November, 1951, and in progress.

Agricultural Economics

1. Girdharilal Sanghi, Agricultural Economics, for Ph.D., begun in November, 1950, and in progress.

Mathematics

1. Narayanrao Jawalker, Teacher, Elasticity, for Ph.D., begun in November, 1951, and in progress.
2. Pattabhi Raman, Elasticity, for Ph.D., begun in November, 1951, and in progress.
3. Mohd. Ahsan, Teacher, Mathematical Theory of Elasticity, for Ph.D., begun in November 1951, and in progress.

Sanskrit

1. Khanderao Deshpande, A Comparative Study of Valmiki's Ramayan

and Kalidasa's works, for Ph.D., begun in November, 1951, and in progress.

2. Shrimati G. Saraswati Mary Burn Appalswami, Teacher, Treatment of Nature in Classical Sanskrit Poetry, for Ph.D., begun in November 1951, and in progress.

3. Shrimati B. K. Rukminiamma, The Concept of Dosas in Sanskrit Rhetoric, for Ph.D., begun in November, 1951, and in progress.

Religion and Culture

1. Mohd. Abdur Rasheed, Islamic Sociology, for Ph.D., begun in November 1951, and in progress.

2. Ali Mohd. Allauddin, The Holy Quran—The Nourishes of Mind and Soul, for Ph.D., begun in November 1951, and in progress.

3. Liyakat Husain, Islamic Democracy and the Early Days of Islam, for Ph.D., begun in November, 1951, and in progress.

Urdu

1. Shrimati Zeenatunnisa Begum, Early Urdu Romances, for Ph.D., November 1951, and in progress.

College of Agriculture

Economics

1. S. D. Mohenpurkar, Cotton Marketing in Nanded, for B.Sc.Ag., and completed in May, 1950.

2. D. B. Mohekar, The Economics of Paddy Cultivation, for B.Sc.Ag., and completed in October 1950.

3. N. G. Murugkar, Marketing of Groundnuts in Hyderabad State, for B.Sc.Ag., and completed in October 1950.

4. Gurunawadi, Agriculture in Yadgir Taluqa, for B.Sc.Ag., and completed in October 1950.

5. M. N. Bhatambrekar, Population and Food Production of Bidar District, for B.Sc.Ag., and completed in October 1950.

6. Mohd. Jameel Ahmed, Thimapuri, Socio-economic survey of Thimapur village (in Hindustani), for B.Sc.Ag., and completed in October 1950.

7. D. N. Borulkar, Socio-economic survey of Chatori village, for B.Sc.Ag., and completed in April, 1951.

8. B. Papiah, Wanparthy as a service Centre to its surrounding villages, for B.Sc.Ag., and completed in April, 1951.

9. Mariguda, Mouza Sanganhal ki Mashi wa samaji tahqiq (in Hindustani) for B, Sc,Ag., and completed in April, 1951.

10. Gopal Rao Vyahalkar, Agricultural Education in the Secondary Stage in Hyderabad, for B.Sc.Ag., and completed in April 1951.

11. Deshmukh, V. K., Socio-economic survey of Ramchandrapur Village, for B.Sc.Ag., and completed in April, 1952.

12. Bhave, M. V., Socio-economic survey of Kandi village, for B.Sc.Ag., and completed in April, 1952.

13. Urkuday Krishna, N., Socio-economic survey of Chandur village, for B.Sc.Ag., and completed in April, 1952.

14. Abdul Qyoom M., Tomato and Brinjal Cultivation and their marketing in the villages around Hyderabad City, for B.Sc.Ag., and completed in April, 1952.

Horticulture

1. Lakshman Vaikar, Bannana Cultivation with special reference to Jintur Taluqa, Parbhani, for B.Sc.Ag., and completed in October, 1950.

2. Karan Pershad, Cultivation of Guava with speeial reference to Guava grown in Hyderabad City, for B.Sc.Ag., and completed in April, 1951.

3. Bhavtankar, B.N., Cultivation and marketing of Flowers in Hyderabad City, for B.Sc.Ag., and completed in April, 1951.

4. Ambadas Rao Joshi, Study of Nursery Gardens in Hyderabad City, for B.Sc.Ag., and completed in April, 1951.

5. Bala Pershad, Banana: Its Cultivation and Marketing in the City of Hyderabad, for B.Sc.Ag., and completed in April, 1951.

6. Kalikasingh, Fig: Its Cultivation in the Maisram area, for B.Sc.Ag. and completed in April, 1951.

7. Bhalchandra Kulkarni, Grape Vine Cultivation at Limbaganesh, for B.Sc.Ag., and completed in October, 1951.

8. Bhale, N.L., Grape Cultivation in Aurangabad District, for B.Sc.Ag., and completed in April, 1952.

9. Deshmukh, B.S., Grape Cultivation in Nanded District, for B.Sc.Ag., and completed in April, 1952.

10. Saxena Sukhdev Raj, Abab-e-shahi grape and its cultivation in Hyderabad, for B.Sc.Ag.,, and completed in April, 1952.

11. Dongaonkar, N. V., Citrus cultivation in Hyderabad, for B.Sc.Ag., and completed in April, 1952.

12. Kulkarni, D.M., Citrus cultivation in and around Parsoda, for B.Sc.Ag., and completed in April, 1952.

13. Kulkarni Giri Rao, Banana Cultivation in Gulberga District, for B.Sc.Ag. and completed in April, 1952.

14. Raghupati Rao, R., The Wild Fruits of Mahboobnagar District, for B.Sc.Ag., and completed in 1952.

15. Aftab Ahmed, Preservation of some of the Important Fruits of Hyderabad for B.Sc.Ag., and completed in April, 1952.

16. Abdul Hameed Faruqi, Study of Ornamental Plants in Landscape Garden, O. U., for B.Sc.Ag., and completed in April, 1952.

17. Mirza Basith Ali Baigh, The Avenue Trees of Hyderabad and Secunderabad, for B.Sc.Ag., and completed in April, 1952.

18. H. A. Razzack Siddiqi, Study of Old Gardens, for B.Sc. Ag., and completed in April, 1952.

Entomology

1. Bhasker Rao Dake, The Pink Bollworm, for B.Sc.Ag., and completed in April 1951.

2. K. V. Vainatheyan, Cultivation and uses of Lac in Hyderabad State, for B.Sc.Ag., and completed in April, 1951.

3. Rajeshwar Rao, The Sugarcane Borers in Nizamabad District, for B.Sc.Ag., and completed in April, 1952.

4. Ashraff, M.A., Insect Pests of Stored Rice and their control in Hyderabad for B.Sc.Ag., and completed in April, 1952.

Agronomy

1. Zaheer Ahmed Ansari, Common Weeds found on the University Farm, for B.Sc.Ag., and completed in April, 1951.

2. Manzoor Hussain, Sugarcane Cultivation at the Effluent Farm, Amberpet, for B.Sc.,Ag., and completed in April, 1951.

3. Rai Machandranath Bhargava, The study of Government Experimental Farm, Parbhani, for B.Sc.Ag., and completed in April, 1951.

4. P. Narhari, Study of Agricultural on my own lands, for B.Sc.Ag., and completed in April, 1951.

5. M. N. Patil, Cultivation of Khariff Jowar in my village, for B.Sc.Ag., and completed in April, 1951.

6. Hari Gopal Deshpande Betel vine Cultivation in Verpgaon village, Mominabad, Taluqa, for B.Sc.Ag., and completed in 1951.

7. Ganpat Rao Bijamwar, Groundnut Cultivation in Nanded Taluqa, for B.Sc.Ag., and completed in April, 1951.

8. Mohd. Ahmedullah, Masarif Paidaish dhan, Nalgonda Taluqa (in Hindustani), for B.Sc.Ag., and completed in October, 1951.

9. Rahimuddin, S. K., Paddy Cultivation at Amberpet Sewage Farm, for B.Sc.Ag.,o and completed in April, 1952.

10. Rajeshwar Rao, S. Paddy Cultivation in Karimnagar District, for B.Sc.Ag., and completed in April, 1952.

11. Ramchander, B. K., Jowar Cultivation in Akalkot, for B.Sc.Ag., and completed in April, 1952.

12. Srinivas Rao, Jowar Cultivation in Sindhnoor Taluqa, for B.Sc.Ag., and completed in April, 1952.

13. Chaudhari Prabhakar, Jowar Cultivation in Parbhani District, for B.Sc.Ag., and completed in April, 1952.

14. Chaudhari Balwant Rao, Cotton Cultivation in Parbhani District, for B.Sc.Ag., and completed in April, 1952.

15. Manohar, K. Tobacco Cultivation in Gulberga District for B.Sc.Ag., and completed in April, 1952.

16. Kishna Rao, K., Castor: Its Cultivation and marketing in Shadnagar Taluqa, for B.Sc.Ag., and completed in April, 1952.

Pathology

1. Gulam Samdani, Smut Diseases of Jowar in Gulberga District, for B.Sc.Ag., and completed in April, 1951.

2. Abdul Razzak Khan, Diseases of Grape Vine in Aurangabad District, for B.Sc.Ag., and completed in April, 1951.

Chemistry

1. D. E. Bhoomkar, Custard Apple seed, its oil extraction and analysis, for B.Sc.Ag., and completed in April, 1951.

Botany

1. Masood Mohiuddin Hasan, The Study of common grasses on College Farm, for B.Sc.Ag., and completed in April, 1952.

2. Lakshman Rao, P. Growing Plants in Nutrient Solutions, for B.Sc.Ag., and completed in April, 1952.

Engineering

1. Radhakrishna, V. K., Study of Water Lifting Appliances, on Government Farms, for B.Sc.Ag., and completed in April, 1952.

Women's College

Urdu

1. Shrimati Razia Begum, Lecturer, Articles on URFI Persian Poet of Moghul Period and on Nazeer, Urdu Poet. Philosophy of Rumi's Love Poetry, begun in 1950-51.

2. Shrimati Zeenathunisa Begum, Lecturer, Research on early Urdu Romances, begun in 1950-51, completed in 1951-52.

3. Rafia Sultana Begum, Lecturer, in Persian, Research on early Urdu Prose early Hindi writers of Urdu, begun in 1951-52.

Marathi

1. Dr. T. G. Kelkar, Lecturer, Research on Marathi Drama and Modern Marathi Poets, begun in 1951-52.

University Science College

Chemistry

1. V. S. Subramanyam, (*a*) Potentiometric estimation of Cobalt and nicekl was read at the 39th session of the Indian Science Congress, held at Calcutta, in January, 1952, for Ph.D., begun in July, 1950, likely to be completed by June, 1953. (Attempts were made to estimate Cobalt and Nickel potentiometrically using potassium thiocyanate. Sharpbreaks were obtained in both the cases. In the case of a mixture, two breaks were obtained, the first break corresponding to Cobalt and the other to Nickel.

   (*b*) Isomerisation of the dark green chromic chloride hexahydrate in nonaqueous solvents published in current Science Sept. 1952. The structure of the complexes formed, are under investigation.

- Sakharam Pathak, Studies on sugar-cane bagasse, for Ph.D., begun in January, 1951, likely to be completed by December, 1953, Approximate analysis of sugar-cane and studies of the physical properties *i.e.*, adsorption desorption relations, X-ray diffractions patterns, of the fibrous material from the sugar-cane bagasse are being done. The water soluble fraction is being analysed and the celluloses from the fibrous part are being fractionated.

Botany

1. Prof. M. Sayeeduddin, Principal, Taxonomy, Ecology and Anatomy of Angiosperms.

2. N. Ramaiah, Miss Qumar Siddiqui, Research Students with Prof. M. Sayeeduddin, Anatomy of Angiosperms, for Ph.D., begun in August, 1952, likely to be completed, in 1955.

3. Dr. M. Abdus Salam, Reader, Plant Rathology, A study of the disease of rice and potatoes,

4. P. N. Rao, Research Student with Dr. Salam, Plant Pathology, A study of the disease of rice and potatoes, for Ph.D., begun in November, 1951, completed in 1953.

5. Dr. M. R. Suxena, Reader, Systematics and Ecology of fresh water algae and Flagellates.

6. A. R. Zafar, Research Student with Dr. M. R. Suxena, Ecology of Fresh Water Algae, for Ph.D., begun in November, 1951, completed in 1953.

Medical College

1. Dr. Hyder Ali Khan, Professor, Embryology reconstruction, begun in April, 1952.

2. Dr. S. A. Rahman, Professor, Effect of variation in pressure in the pulmunory artery on the electric-cardiographic features, begun in 1952.

3. Dr. M. Y. Ansari, Professor, Camaquuine in the treatment malaria begun in 1948 Paper under publication in " The Indian Journal of Medical Sciences ".

4. Dr. M. Shah Nawaz, Professor, Observation on circulation time in heart, lung diseases and Erythercyte sedimentation rate in disease, begun in January, 1951, and in progress.

Physiology

1. S. A. Rahman, Professor, Pathway of impulse conduction in the heart, begun in 1950, completed in 1951, Read at the section of Physiology Indian Science Congress, 1951, Bangalore. (Unipolar leads from the surface as well as from inside the heart cavities were obtained in anaesthetsied dogs and in pithed frogs. The result in the dogs were compatible with suggestion that the inter-ventricular septum is activated from left to right. The experiments on frog heart suggest that as, in the case of mammalian heart, the frog heart also is activeted from the endocardial surfce towards the epicardium.)

Pharmacology and Therapeutics

1. M. Y. Ansari, Prof. Comoquin in Malaria, begun in 1948, completed in 1952, Published in Indian Journal of Medical Sciences, May, 1952, (The effects of single doses of comoquin in cases of malaria were investigated. It was found effective in single doses of 0.6 for an adult. It was found to bring down the temperature to normal in an average period of 29.9 hours, and to make the peripheral blood free from the sexual forms of malarial parasites by the 3rd day.)

Medicine

1. Shah Nawaz Prof., (*i*) Circulation time in heart and lung disease, (*ii*) Erythrocyte sedementation rate in disease, begun in 1952,

by the end of 1953, (The circulation time are to tongue and arm to lung is being estimated invarious lung diseases and diseases of the heart both congenital and acquired. For the arm to tongue time calgluconate and for the arm to lung time either is being used. Decholin would have been better instead of cal. Gluconate but unfortunately it is not available. The Erythrocyte sedementation rate is being taken in practically every case that is admitted to know how it is affected in various diseases met with in our country.)

Nizam College

Cytogenetics

1. U. B. Sachidananda Swami, Lecturer, Botany, Cytology and Genetical aspect of Castor, begun in 1949. (How polyploidy can be induced in castor. How to improve the yield of Castor in relation to Polyploidy. What factors (genegenos) control the yield in Castor and whether they can be modified more favourably with external inducements as X-ray, Cosmic rays and others.)

Mathematics

1. Dr. Afzal Ahmed, Lecturer, (*a*) Note on the solution of infinite linear equation in infinite unknowns, begun in January, 1949, completed in April, 1953.

   (*b*) Group method for determining various physical constants of crystals, etc.,

2. V. V. L. Narasimha Rao, Lecturer, The Theory of Integration and its applications in Infinite Series, begun in June, 1951, ended within a year. (The failure of Rie Integration in certain non-Integrable Functions—Their Integrability by means of Lebesque Theory of measure and their subsequent applications in the theory of uniform convergence, etc.)

Mathematics (Applied)

1. Dr. S. S. Datar, Lecturer, Feeble Paramagnetions of Molybedenium trioxide, begun in September, 1950, almost completed. (In previous papers (1948 Nature 158, 518 ; 1949 Ind. J. Physics 23, 16) it has been shown that in compounds containing hexavalent chromium such as Chromium trioxide and Potassium Chromate a part of the spin is impaned which accounts for the paramagnetic effect they exhibit. The free spin state in Molybedenium trioxide has now been determined in a similar way from structure diagrams constructed using X-Ray date as in the case of chromium trioxide and Potassium chromate and it has been shown that paramagnetism calculated from the free spin factor is in fair agreement with the experimental results.)

Chemistry

1. K. R. Mathur, Lecturer, The preparation of ' Organo-cadmium Compound ' with a view to study the comparative behaviour of Cd. & Hg.

in the formation of Organo-metallic derivatives, begun in May, 1951, likely to be completed in 2 years. (For the past one year the Research work on the above subject is being carried out under the guidance of Dr. N. V. Subba Rao, Methods of Cd. and all methods have been examined. Pyridine method has been chosen as the best. Organocadium compounds of certain amides and imides have been prepared and are under investigation. The work is in progress.)

2. V. D. Thatte, Lecturer, Kinetics of the Oxidation of hydroxyacids by Kmno4 in general and citric acid in particular, begun in 1951, likely to be completed in 1953, Published a paper 'a new volumetric method for the estimation of citric acid in the proceedings of the Indian Science Congress held at Poona in 1950. (Citric acid is not easily Oxidised by acid KMno4. It takes a few hours for the complete oxidation. The Oxidation depends.)

3. Madhukar Rao D. Bhole, (*i*) Extraction and study of the Taunis from different barks and trees grown in Hyderabad, begun in March, 1951, completed in December, 1952. (Extraction, of taunis from different barks was attempted. Barks of trees like Amaltaras and Babul were under study. Extraction was done by the following solvarts—water-alcohol and Acetone.)

(*ii*) (Iodination of Hydrocarbons, Hydrony compounds and aromatic acid Iodina of Benzoic Acid, Paraphemol and Benzene was successfully completed by using for hydrol—their M. P. S. were determined.)

Physics

1. B. Narayana Murthi, Lecturer, Dynamic elastic constants of metals, begun in 1952. (Dynamic elastic constants of metals using electromate methods of excitation.)

2. Suryanarayana, Lecturer, Dielectric constant and power factor of certain coloured crystals, begun in 1952, and completed. (Studying the dielectric constant and power factor of certain coloured crystals and some interesting results have already been obtained.)

3. P. J. Jacob, Lecturer, Method of measuring magnetic susceptibilities, begun in 1952. (An interference method of measuring magnetic susceptibilities is being developed.)

4. Dr. N. Rajeshwar Rao, Effects of mixtures on strong electrolytes, begun in 1952. (Raman effect of mixtures of strong electrolytes.)

Zoology

1. Dr. Qadir Husain Qureshi, Reader, "The relationship between the auditory organs and the air bladder in a cyprinoid fish 'Barbus Sarana,' begun in 1951, likely to be completed in 1953. (In the young stages of the fish the homology of the Weverian ossicles are being traced.)

Commerce

1. Tilak Raj Chadda, An enquiry into the family Budget of Middle classes in Hyderabad, begun in 1952, to be completed in end of 1953. (About 400 family budgets pertaining to Middle classes having monthly income of 250—800 are to be collected by the method of Random Sampling. The results are to be tabulated at the end of the enquiry. The data collected would throw light on Middle class family income, expenditure on food, clothing, household and miscellaneous items and indebtedness of the families and the savings and investment habits. The effects of the post-war inflation on the standard of living of the families is to be determined.)

Indian History and Archaeology

1. Dr. M. Rama Rao, (*i*) The coins of Gantamiputra Satakarni, Read at Section I of the Nagpur session of the Indian History Congress, December, 1950. (About coins of Gantamiputra.)

(*ii*) Note on Ananda Gotra Inscription, Read in the History section of of the Lucknow session of the All India Oriental Conference, November, 1951. (An inscription which extols the exploits of Kandararaja and has been assigned to the middle of the 6th century. The Chezerla inscriptions show that king Madhava's I battle was fought with Vishnukundin and not with Pallava.)

(*iii*) The Satvahana rival of the Rudra daman. (History of rulers from 78-150 A. D. as identified by the inscriptions and coins.)

(*iv*) Edited Journal of Dekkan History and Culture Vol. I—2 and Vol. III Hyderabad Published. The Kakatiyas of Warangal (Hyderabad).

Under Preparation : Buddhist antiquities of Andhradesa started in March 1952.

History

1. R. Narsimha Rao, Life in Medieval Andhra A. D. 1000—15000 A. D., for Ph.D., begun in November, 1951, likely to be completed in November, 1953. Study of Kutub (Shahi's conquests in Eeastern Dekkan. Study of Salankayam Dynasty. Study of Cutus who lived in Vanavasi.)

2. S. Natrajan, (Note on the 14 unpublished letters of William Smyth to his father, read at the 27th Session of Indian Historical Records Commission at Nagpur in the year 1950, begun in 1951 and 1952) (The letters of William Smyth relates to the life of the Company's servants and their mutual quarrels addressed to his father.)

(*ii*) Note on the unpublished letter of Mahfuz Khan Bahadur read at the 28th Session of the above Commission at Jaipur in the year 1951. (Letters of Mahfuz Khan addressed to some of his European and Indian patrons which give a descriptive account of the travelling and transport conditions from Caddapah to Hyderabad.)

(*iii*) Society and Culture under the Setupatis. Paper read at the Indian History Congress 14th Session at Jaipur in the year 1951. (Description of the Society and Culture in the Ramnad Kingdom under the Setupatis and the encouragement given to the Tamil Literature.

Politics

1. P. V. Rajgopal, An interpretative field study of the General Elections in Hyderabad carried out in collaboration with Prof. H. K. Sherwani, completed in 1952. (Report on the Study of General Elections in Hyderabad which will be published by the All India Political Science Association in its journal.

PANJAB

Zoology

1. Rattan Lal, ' The Biology of Empoasca Karrivar Motti Pruni, *Crolentiades*, Pallidifer Walker, and *Myzus*, Persicae (Sulzar) and the efficiency of DDT, a Modern Insecticide in controlling these insects, for Ph.D., completed in 1950.

2. A. N. Gulati, 'Microscopical studies in cotton fibre, etc., and zoological papers,' for Ph.D., completed in 1951.

Sanskrit

1. Jugal Kishore Trikha, 'Turiya Avastha for Ph.D., completed in 1950. (Turiya, the Fourth, defined as the Transcedetal State of Consciousness. Identity of Turiya with Supreme Being. The ultimate unity of the Transcendental and the immediate of Vidya and Avidya. The Absolute state reflected through 'Virtue' of nobler men..... Conception of Turiya amongst the Christian mystics. Turiya in the vernacular writers like Tulsi Das and Guru Nanak).

2. S. D. Bhanot, ' Sane Shyam Alam ', for Ph.D., completed in 1951.

Chemistry

1. Roop Chand Sahni, ' Molecular Structure ' for Ph.D., completed in 1950.

2. P. C. Sawhney, ' Investigations in the Importance of Manganese in the Nutrition of Animals in India,' for Ph.D., completed in 1951,
   (*i*) Analytical Methods and Techniques. (*ii*) The Distribution of mangenese in Biological materials.
   (*iii*) Manganese Metabolism studies.
   (*iv*) Studies on the Composition of blood in relation to Manganese in take.
   (*v*) Studies on the Metabolc interrelationship of cobal.

History

1. K. R. Prabhakar, ' North-West Frontier Policy ' of Government of India 1849—1899, for Ph.D., completed in 1951.

2. P. N. Chopra, ' Some Aspects of Society and culture during the Mughal Age as depicted by foreign travellers' (1526—1707), for Ph.D., completed in 1951.

English

1. S. C. Chakraborty, ' Sensibility in eighteenth Century ', for Ph.D., completed in 1951. (In view of the present-day interest in the psychological novel, the modern conception of the novel as a mirror of the mind's workings, and the incursion of modern psychology in the modern novel, it is in the opinion of the present writer, important to study how our 18th century predecessors in the novel dealt with aspects of a psychological phenomenon—the most common psychological phenomenon of the times—in their works of art.)

PATNA

Sanskrit and Philology

1. Dr. T. Chowdhury, Head of the Department, (*i*) Some Phonatic peculiarities ot the Bengali dialect of Manbhum, begun in August, 1949, Completed in November, 1949 but revised in June and July 1950, Published in Journal of the Asiatic Society, letters Vol. XVII, No. 2, 1951. (Peculiarities in the articulation and behaviour of certain sounds in the Manbhum dialect of Bengali have been sicentifically presented here.)

(*ii*) Linguistic aberrations in Kalidasa's writings, begun in 1946 completed in December, 1950, Published in Journal of the Bihar Research Society, Vol. XXXVI, parts 3-4, 1950. (Aberrants uses of Kalidasa have been discussed here in all their aspects, phonetic, morthological, syntactic and semantic.)

(*iii*) Linguistic Experiments in the Bhagavata Purana, begun in June, 1951, likely to be completed in 1955. (It is an attempt to present a comprehensive picture of the linguistic experiments carried on in the Bhagawta Purana.)

Psychological Institute

Psychology

1. D. Sinha, Hd. of the Dept. of applied Psychology, (*i*) Behaviour in a Catastrophic situation : A Psychological study of reports and rumours, begun in June, 1950, completed in September, 1950, Published in British Journal of Psychology, August, 1952. Different report circulating during the Darjeeling landslides of June 1950 have been collected, and the psychological mechanisms at work are discussed.)

(*ii*) A Study of Level of Aspiration of college students with reference to examination, begun in July, 1950.

(*iii*) Rumours as a factor in Public opinion during Election, begun in December, 1951, completed in April, 1952. To be published in the Journal of Psychology and Education (Baroda University), (Reports circulating in various constituencies during the last general elections have been collected, and their role in the formation of public opinion has been discussed.)

2. D. Bagh, Res. Asstt., (*i*) 'A New Type of Phi-Phenomenon,' begun in August, 1951, In progrest, First part of the work read in the Psychology Section of All-India Science Congress in 1952, and in abstract of it published in the Abstracts of the A. I. S. C. (The point in this research is the phenomenon that is perceived. Whether it is central or peripheral one. So far as the data shows, the phenomenon seems to be central one. But the experimenter thinks that no definite conclusion should be drawn at this stage. For this thorough investigation should be continued.)

(*ii*) 'A New Method of Measuring Suggestibility, begun in

December, 1951, to be completed shortly. (This experiment is designed after the Classical Experiment of Whipple on this subject.

The experimenter has introduced some changes in the original procedure which apart from reflecting new lights on problems of individual differences, increase the efficiency of the method to a considerable extent. This when complete will be more useful procedure than what it is now in the classical form.)

3. Ambika Prasad Podda, Res. Asstt., An Experimental Project of Reduction of Inter-Caste tension in village, completed in June, 1951. Published by Dr. Gardner Murphy in his UNESCO Report. (A very high form of tension prevailed between the gowalas and Kurmis of a village in Biharshariff so that several attempts for direct reapproachment between them failed. Reduction of tension was obtained however, by making their children play together and thereby exploiting their identification with the children.)

4. Miss B. K. Malhotra, Res. Asstt., (*i*) Attitude of Refugees and non-Refugees towards Pakistan, for M.A., begun in September, 1950, completed in May, 1951, Published a synopsis of it in UNESCO report by Dr. Gardner Murphy. (It was one of the UNESCO TENSION PROJECTS. Results were interesting and encouraged further testing. It was found that those who suffered from Pakistan did not entertain a higher degree of prejudice against Pakistan than those who did not suffer. It was also found that Refugees still identified with Pakistani culture and were critical towards Indian Government. This study brought out interesting streotypes about religion Muslims, Congress Government a gentleman and so on.

   (*ii*) A study of fingerpainting on two groups of children, for Ph.D. begun in 1952, likely to be completed by October, 1953. (It was started to check the validity of this method of Personality study with children as subjects. But due to difficulties the plan was changed in December, 1952. The fingerpainting test will be checked by R.T., and T.A.T. and the subjects will be adult college students.)

   (*iii*) Emotional needs as expressed by Murray's T. A. T. cards, begun in January, 13, 1953, completed in May, 1953. (This study was suggested by the voluminous data of personality study lying in the Institute. The plan is to see what needs are tested by the T. A. T. cards that we use in the Institute. The data is already present; only analysis and presentation need be done.)

5. Nawal Kishore Prasad, Attitude survey of Labour in Bata Shoe Factory for M.A.

6. Miss Perin M. Mehenti, Study of Adolescent Personality by Rorschach Technique, for M.A.

7. Ambika Prasad Poddar, A Comparative Study of the Basic and Non-Basic students, for M.A.

8. Vijay Kumar Shrivastava, Job Analysis in a Machine Shop in Cycle Factory, for M.A.

9. Balkrishna Babulal Nagar, Consumers Research, for M.A.

10. T. N. Mishra, A Study of Measurement of Teachers' Qualities, for M.A.

11. A. Satyanarayan Murti, Investigation into effective head lines in commercial advertisement, for M.A.

12. Miss S.R. Upadhyaya, A Psychological Study of Legislator's Attitudes and Opinions, for M.A.

13. Prem Shanker, Comparative Study of Personality Structure and of Attitude towards High caste Hindus in educated and uneducated Harijans, for M.A.

14. M.N. Datta, Study of Refugee Attitude and Refugee Morale in Refugee Camp, for M.A.

15. T. K. Sharma, Factors in Political Attitude of College Students, for M.A.

16. Miss B. K. Malhotra, Attitude of Refugees towards Pakistan, for M.A.

17. Ram Lakhan Prasad Gupta, Scientific Survey of Political Attitude, for M.A.

18. R. P. N. Singh, Reduction of Inter-Caste Tension in a village in Bihar by Action Research, for M.A.

19. A. V. Rao, Effect of University education on Caste Prejudice among Brahmins and Non-Brahmins in the South, for M.A.

20. Bishwanath Mishra, Workers Attitude towards Drinking and Prostitution, for M.A.

21. Girishnandan Singh, An Empirical study of the attitudes of the Graduate students and Government Employees towards the Congress and the Congress Government, for M.A.

22. Niwas Pathak, A Comparative study of the Attitude and Opinion of the "Male and Female students towards Marriage", for M.A.

23. Hem Chandra Jain, Hindu Code Bill, for M.A.

24. Miss P. Sheopuri, A Pshychological analysis of the worship of Goddess Durga, for M.A.

25. Sushil Madhav Prasad Jamuar, The study of aboriginal tension in Chotta Nagpur and the influence of Discrimination, for M.A.

26. Ram Narain Lal, A Psychological Research in attitude on businessmen towards income tax, for M.A.

27. Pulin Krishna Garg, A study of Group Dynamics in the adjustment process in a play situation, for M.A.

28. O. P. Bisla, A Scientific Psychological study of two groups, Delinquents and School children, with regard to their general outlook toward life as indicated by T. A. T., for M.A.

29. Sarju Prasad Sinha, Hypothesis of Learning, for M.A.

30. Miss Vimla Gupta, Comparison between Rorschach & H. T. P., for M.A.

31. Harimohan Pd. Sinha, A. Psychological Research in study of factors of absenteeism in Bata Shoe Factory, for M.A.

32. Gouri Shankar Verma, Effect of music on Psychological work, for M.A.

33. Miss Amala Ghosh, Comparative Study of 8th and 9th class students on study habit, for M.A.

34. R. K. Akhauri, The effect of Common Canteen on Caste Prejudice in Bata Shoe Factory, for M.A.

Geology

1. Dr. S.C. Chatterjee, Teacher, (*i*) The Periodotites of Manpur, Dhalbhum, Singhbhum Dt. and the Origin of the Associated Asbestos deposits, begun in 1945, ended in 1952, to be published in the Bulletin Geological Society of America. (A petro chemical study of the ultra basic rocks containing primary athophyllite, and the origin of tremolite asbestos by lime metasomatism of chrysotile asbestos.)

   (*ii*) The Charnockite Rocks of Mor Valley, Santhal Parganas, begun in 1950, ended in 1952, Published in Patna University Journal (to be published in the forthcoming issue). (Origin of charnockitic rocks by metamorphism and granitisation.)

Science College

Physics

1. B. N. Singh, Rupture of Water drops, Published in Proc. of Indian Science Congress, 1951.

2. G. P. Dube & S. Jha, (*i*) On calculation of X-ray disintegration energy. Published in Indian Journal of Physics, 1952.

   (*ii*) On the closing of Protonshells at Z=58, Published in Physical Review, 1952.)

3. H. N. Yadav, (*i*) High Energy Neutron-Proton Scattering, Published in Indian Journal of Physics, 1952.

   (*ii*) Scattering of Vast Position by Nuclei, Published in Proc. of Phy. Society, London, 1952.

4. J.K. Patnaik, Band Spectra of Oxides of Ca & Mg., Published in Current Science, 1952.

Urdu

1. Syed Akhtar Ahmad, Head of the Department, (*i*) Development of Urdu language and literature in Bihar with special reference to the Novel," for D.Litt., begun in January, 1951 likely to be completed by July 1953,

   (*a*) Philosophy of language.

   (*b*) Philological language of Urdu.

   (*c*) Birth and development of Urdu in India—Basic linquistic form of Apabhramsa on which Urdu is based—Different theories—Comment and opinion on the point.

   (*d*) Development of Urdu in Bihar.

   (*e*) Novel (Urdu) in Bihar.

   (*ii*) (*a*) Tanqueed-e-Jadeed and (*b*) Tahqeeqo Tauqeed begun in 1940, ended in 1951, Published at Patna by the Shad Book Depot., Research papers on early Urdu, Dravidian and Urdu, Tulsidas, and Surdas, and Ghalib and literary revolution of Urdu poets and writers.

2. Syed M. Sadrudin, Lecturer, (*i*) " Dard Dehlavi," (Paper of Criticism with a Selection of Dard,)" begun in 1950, ended in 1952, Published at Patna—Pushtak Bhandar, (Revolution of Dard, the poet.)

   (*ii*) " Shibli Nomani (Paper of Criticism with a selection of Shibli)," begun in 1951, ended in 1952, (Revolution of Shibli, the great prose writer.)

3. Shakil-ur-Rahman (*i*) Adab aur Nafsiat begun in 1951, ended in 1952, Published at Patna—Ashayat ghar, Psychology and literature—essay.

   (*ii*) (*a*) Zaban aur Avam, begun in 1952, completed in 1952, Published (Essays of literary and linguistic criticism.) (*b*) Sohai Azimahadi. (*c*) Rashid Siddiqui. (*d*) Fani ka ghum.

4. S. A. H. M. Sajid, " Wali Dakni," begun in 1952, completed in 1952. (Essay of Criticism.)

5. Asad Hussain, " Khavateen Afsana Nigar," completed in 1952. (Essay of Criticism.)

6. Ibrahim Balkhi, " Kal imuddin—Ek Naqqad," completed in 1952. (Essay of Criticism.)

7. Anis Imam, Urdu Shaeri men Jossish ka Maqam, begun in 1952 completed in 1952, (Essay of Criticism.)

8. Abdus Salam,1. " Azad Saheri," completed in 1952. (Essay of Criticism.)

Chemistry

1. Dr. P. C. Sinha, Head of the Department, and G. C. Bhattacharya, Qinoline Complexes of Zinc and Cadimum Sulphatics and their Heats of Formation, Published in J. Indian Chem. Societ, 1950, Vol. 27, p. 21. (Compds. prepd. (Zn. $2C_9H_7N$) $S0_4$,$8H_2O$ and (Cd. $2C_9H_7N \cdot 2H_2O$) $SO_4 \cdot 4H_2O$. Heats. of formation 15, 704 and 17,206/ G. F. W., respectively.

2. Dr. P.C. Sinha and N.G. Mitra, Dissociation pressures and Pressure—Composition Isothermals of Copper Pyridine Nitrates, Published in J.I.C.S. 1950, Vol. 27, pp. 29. (Dissociation pressures from 30—100 C. have been measured. Isothermals at 30° have also been measured. Phrases formed are Cu $(NO_3)2 \cdot 6Py$. $Cu(NO_3)2 \cdot 5Py$. $Cu(NO_3)2 \cdot 4Py$. Heats. of formation found are 8,950, 13, 420 cals and 14,350 cals respectively.

3. Dr. P. C. Sinha and G. C. Bhattacharya, (*i*) Quinoline complexes of Cobalt and Nickel Sulphates, Read in the Chem. Section of 39th Session of Ind. Science Congress, 1952 and it has been communicated to the J. I. C. S. for publication. (Compds. formed $COSD_4$. $C_9H_7N \cdot 6H_2O$ and $Niso_4$, $3C_9H_7N \cdot 4H_2$. Heats. of formation 3, 395 and 11,632 cals./G. F. W. respectively.

   (*ii*) Thesis entitled "Studies on the Complexes of the Sulphates and Thiosyanates of Zinc, cadimum Nickel and Cobalt with quinoline and ∝ picoline, for Ph.D.

   (*iii*) ∝ picoline complexes of Zinz, Cd, CO and Ni Sulphates, Read before the Chem. Sci. of Indian Science Congress in 1953, (Compds. formed Zns. O_4, 1Pico·$5H_2O$ $CdSO_4$, 2Pico. $2H_2O$, $COSO_4$. 1 Pico $2H_2O$ and $NiSO_4$. 2Pico.

   (*iv*) Quinoline complexes of Zinc and cadimum theocyanates, Work completed.

4. Sudhindra Nath Das, (*i*) Thermodynamics of Evaporation(with B. P. Gyani), begun in 1949, ended in 1951, Published in Bull. Science College Phil. Soc. 1951, 21, 57. (The talent heats of evaporation and the entropy changes accompanying them have been calculated for a large number of organic substances. Some serious departures from the rules of Trouton and Hildebrand have been demonstrated, and some constitutive factors have been discussed.)

   (*ii*) Free volumes and Internal pressures of liquids and their entropies of evaporation (with B. P. Gyani) begun in 1949, ended in 1952, Published in J. Indian Chem. Soc. 1952, 29, 858. (The rules of Tronton and Hildebrand in respect of evaporation have been discussed in the light of many new data. A Theoretical basis for the Hildebrand Constant has been demonstrated and departures from this constant have been shown to be associated with departures from the Van der Waals vapour pressure equation. Constitutive influences in the values of internal pressures and free volumes have been discussed.)

(*iii*) On the verification of Plank's equation for liquid junction potential by Ghosh's technique of drop Contact type liquid junctions. begun in 1953. (Want of a sensitive galvanometerstand on its satisfactory progress. Plank's conception of sharp potential at the boundary between two liquids can only be attained by drop contact technique.)

5. Dasrath Mandal, Lecturer, Cyanine Dyes, for Ph.D., begun in February, 1952, likely to be completed in 1953. (A work on the preparation and study of properties of Cyanine Dyes having Oxazole rings was taken up. Some of the compounds have been prepared and others are at hand. Their chemical and physical properties will be studied later on.)

Organic Chemistry

1. S. K. Guha, Professor, (*i*) Studies on Indigoid Vat dyes Pt. VI, begun in July, 1949 completed in May 1950, Published in Journal, Indian Chemical Society, 1951, 28, 203. (The 7-chloro-derivatives of bis-2-thionappthene-ethylene, indigo, 2-thionaphthene—9′ phenomthene indigo and its 2′-nitro derivative, benzylidene-2-thionaphthene and two of its substituted compounds have been prepared. The dyeing shades of the thioindigoid dyes have been studied on wool and on cotton and those of the thioindo genides on wool only.

(*ii*) Dyes derived from Acenaphthenequinine, Pt. XI, begun in January, 1951 completed in November, 1951, Published in Journal, Indian Chemical Society 1952, 29, 415, (6-Chloro-3-hydroxy thionaph-thene has been condensed with acenaphthene quinone and a few of its substituted products and also with Phenomthraquinone. The colour and the dyeing shade of 2-(6=chloro) thionaphthene—acenaphthylene-indigos, prepared now, have been found lighter than those of the corresponding dyes of the 5—chloropenes already studied.)

2. Dr. B. Thakur. Assistant Professor, (*i*) Some derivatives of Benzyl Pyridine, begun in July, 1950, completed in May, 1951, Published in Science and Culture 17, 129, 1951.

(*ii*) The Colour change of carbon compounds in Bleaching Powder solution, begun in July, 1951, completed in April, 1952.

3. Dr. J. N. Chatterjee, D.Phil, (Oxon.), Part VI, (*i*) Studies in indigoid dyes, begun in July, 1949. Published in J. I. C. S. 1951, 28, 103. (*ii*) Meyer's 2-methyl-4 : 6-diphenylpyridine : Determination of the structure in view of Gastaldi's objections, Published in J. I. C. S., 1950, 27, 667.

(*iii*) A synthesis of Kostanecki's 3 : 8 : 9-trimethoxy—B—brazan Published in Experientia, 1951, 7, 374.

(*iv*) A note on the decomposition and cyclisation of w-diazo-o-methoxy-acetophenone, Published in Sci. and Cult., 1952, 17, 345.

(*v*) 1 :3 Dimethyl-2-azafluorenone : A note on Meyer's pyridine Synthesis Published in J. I. C. S., 1952, 29, 323.

(*vi*) Experiments on the synthesis of Furano compounds, Part I. A novel route to β-brazans in press.

(*vii*) Experiments on the synthesis of furano compounds. Part II in press.

(*viii*) An improved method for the synthesis of bis-2-thiomaphthen-ethylene-indigos in press.

(*ix*) Some condensation products of 1:2-diketohydrindene, Ready for publication.

(*x*) Experiments on the synthesis of furano compounds. Part III, Ready for publication.

(*xi*) Indigoid vat dyes of isatin series, Part VII, Ready for publication.

(*xii*) Synthesis of azafluorenones and brazanquinones, Ready for publication.

Inorganic Chemistry

1. Dr. S. P. Ghosh, Assistant Prof. (*i*) Complex compounds of Cu, Ni, Co with benzimidazole and their magnetic properties, begun in December, 1949, completed in January, 1951, Published in Jour. Ind. Chem. Soc., 1951, 28, 710.

   (*ii*) Complex compounds of copper and nickel with N_1-phenyl-methyl biguanide, begun in September, 1950, completed in September, 1952, communicated for publication to Jour. Ind. Chem. Soc.

2. A. K. Chatterjee and A. K. Banerjee, with Dr. S. P. Ghosh, (*i*) Investigation on N_1 substituted biguanide on the type of complexes formed with copper, nickel and palladium, for Ph.D., work on progress.

   (*ii*) Investigation on the $\propto =$ isatin oxime complexes of bivalent metals, for Ph.D., work on progress.

   (*iii*) Ellucidation of the structure of oxalenediural dioxime complex of nickel and palladium, for Ph.D., work on progress.

Chemistry (Physical)

1. Dr. B. P. Gyani, Professor, (*i*) Adsorption of Organic Dyes on Silica Gel. I. begun in 1945, completed in 1950, Published in J. Indian Chem. Soc. (Industrial and news Edn.) 1950, 13, 1. (The adsorption of methylene blue, crystal violet, and night blue on coarsely divided silica gel from aqueous solution has been studied. It is found that the isotherms are not quite reproducible. It has been shown that the molecular conditions of these dyes in solution are simple. Relations with solubility and molecular weight are discussed.)

   (*ii*) Adsorption of Organic Dyes on Silican Gel. I, begun in 1946, completed, 1950, Published *Ibid*, 1950, 13, 6. (An extension of the above work showing the effect of powdering on the same adsorbent.)

(*iii*) Adsorption of Organic Bases on Silica Gel and Heats of Adsorption II, begun in 1945, completed in 1950, Published, in J. Chem. Soc. (London), 1950, 1521—24. (The Adsorption of organic bases (diethylamine, tri-ethylamine, pyridine, a-picoline, and piperidine on silica gel were measured at different temperatures upto about 70°. The nature of the isotherms obtained has been discussed. The values of heats of sorption and the changes accompanying them have been calculated. It is found that the motions of the sorbed molecules are more restricted than those in the free liquid state.)

(*iv*) Adsorption of Alcohol on Silica Gel., begun in 1943, completed in 1950, Published in J. Indian Chem. Soc. 1950, 27, 577—85. (The sorption of ethyl alcohol, carefully freed from water and other impurities, on silica gel, prepared under different well-defined conditions, has been studied in detail. It is found that depending on circumstancs, quite different isotherms may be obtained, for which tentative suggestions have been made.

(*v*) Adsorption of Organic Dyes on Silica Gel. III, begun in 1946, completed in 1950, Published in Bull. Sci. Cool. Phil. Soc. 1951, 21, 63. (Extension of the fore-going papers on the same subject. It has been shown that the anomalies of the adsorption isotherms described before are completely removed by reducing the adsorbent to a fine powder, at least 80 mesh.)

(*vi*) Thermodynamics of Evaporation. Internal Pressures and Free Volumes of Liquids and their Latent Heats and Entropies of Evaporation (with S. N. Das), begun in 1949, completed, 1951, Published, in J. Indian Chem. Soc. Published, Bull. Sci. Coll. Phil. Soc. 1951, 21, 57, (The latent heats of evaporation and the entropies accompanying them have been calculated for a large number of organic substances. Some serious departures from the rules of Hildebrand and Trouton have been demonstrated, and some constitutive factors have been discussed.)

(*vii*) Adsorption of Organic Vapours on Silica Gel. and Heats of Adsorption III, begun in 1945, completed in 1950, Published in J. Indian Chem. Soc. 1952, 29, 82—91, Sorption of a large number of organic substances on silica gel (from vapour phase) have been described. The results have been used to discuss some of the recent theories of sorption. The BET and Capillary theories have been particularly shown to be far from amenable to some well established conceptions in physical chemistry.)

(*viii*) Adsorption of Alkyl Halides on Silica Gel. begun in 1945, completed, in 1950, Published, J. Indian Chem. Soc. 1952, 29, 317. (The adsorption of a number of lower alkyl halides on silica gel has been studied from the vapour phase, and discussed in relation to current theories of sorption.)

(*ix*) Viscosity of Iso-electric Gelatine Solutions, (with J. C. Ghosh), begun in 1949, completed 1951, Published, in J. Indian Chem. Soc. 1952, 29. 615, (Anomalies in the viscosity of gelatine in respect of pH of the medium have been described. Some conclusions as to the state of gelatine in these solutions have been drawn.)

(*x*) Sorption of Water Vapour by Alumina Gel (with A. P. B. Sinha), begun in 1950, completed in 1950, Published in J. Indian Chem. Soc. 1952, 29, 582. (Sorption of Water vapour by alumina prepared under specified conditions has been described. The effect of treating the gel indifferent ways has been discussed and a new interpretation of the hysteresis observed has been given based on orientation in the sorbed phase.)

(*xi*) Factors Governing hardness and transparency of Alumina Gels. begun in 1949, completed in 1951, Published, in J. Physcial Chem. (America), 1952, 56, 762. (Conditions under which a hard, transparent and sorbing alumina can be prepared such as would be commercially acceptable, have been described. About a dozen other samples have been prepared and their properties discussed.)

(*xii*) Free Volumes and Internal Pressures of Liquids and their Entropies of Evaporation (with S. N. Das), begun in 1949, completed in 1952, Published in J. Indian Chem. Soc. 1952, 29, 858. (The rules of Trouton and Hildebrand in respect of Entropies of Evaporation have been discussed in the light of many new data. A theoretical basis for the Hildebrand constant has been demonstrated and departures from this constant have been shown to be associated with departures from the van der Waals equation for vapour pressure. Constitutive influences in the values of internal pressures and free volumes have been discussed.)

(*xiii*) Viscosity of Glucose, Urea, and Gelatine Solutions and Some Properties of the Dissolved Phase (with J. C. Ghosh), begun in 1950, completed in 1951, but accepted for publication in J. Indian Chem. Soc., Paper No. 3599-52. (Constants of the Sakurada equation have been calculated for these solutions from viscosity measurements (Ostwalds and Scarpa's methods) and the anomalies in their values have been discussed.

(*xiv*) Behaviour of acid and alkalis towards Gelatine (with J. C. Ghosh), begun in 1951, completed, in 1952, (The nature of binding between dissolved gelatine and acids and alkalis has been discussed with the help of data obtained electrometrically.)

(*xv*) Sorption of water vapour by gelatine (with J. C. Ghosh) begun in 1952, completed in 1952. (The sorption of water vapour on solid gelatine shows no essential departures from sorption isotherms found with inorganic adsorbents (carbon or silica). The data have been discussed in relation to possible structure of solid gelatine.)

2. Dhirendra Nath Ghosh (*i*) The Electrical cane juice clarification Process and its maiden run, begun in 1940, ended in 1953. (A new process of Sugar manufacture without using Lime and sulphur has been discovered and found practicable on a large scale.

(*ii*) Regeneration of used filter cloth in The Electrical cane juice clarification Process and its maiden run, begun in 1952, completed in 1953. (By treatment with H_2SO_4 free and washing.)

(*iii*) Economising current consumption in The Electrical cane juice clarification Process and its maiden run, begun in 1952, completed in 1953, (By lowering Voltage and current density.)

(*iv*) Removal of battery plate fouling in The Electrical cane juice clarification Process and its maiden run, begun in 1952, completed in 1953, (By desiring special comb type washers.)

3. Dhirendra Nath Ghosh in collaboration with Prof. Sudhindra Nath Das, On the verification of Plank's equation for liquid junctions potentials by using Ghosh's technique of drop contact type liquid junctions, begun in 1953. (The absence in the Physical Chemistry Lab of a Sensitive galvanometer is causing considerale delay in this research. Plank's conception of sharp potential at the boundary best completing two liquids can only be attained by drop contact technique.)

4. Satya Narain Prasad Research, Student with B. P. Gyani, (*i*) Studies in electroplating for Ph. D. begun in 1951, (Electrode potentials in a number of electroplating systems and hence the decomposition potentials of the salts concerned under various conditions have been studied. The nature of the deposit under various conditions has been investigated.)

(*ii*) Behaviour of the Hydrogen Electrode for Ph.D. begun in 1952, completed in 1952, (In the course of the above investigation very erratic results were obtained when an attempt was made to measure the pH of NiSO4 solution. A detailed investigation of the behaviour of Hydrogen Electorde has therefore been completed. The effect of thickness of the coating, temperature of liquid in contact of the electrode while washing it ,polishing and addition of extraneous materials, *e.g.*, mercuric chloride, have been fully studied.)

(*iii*) Electrometric studies of Chemical Reactions for Ph.D. begun in 1952, (standard oxidation-re-duction potentils of a number of systems have been determined. The nature of the reaction between KI03 and KI in presence of various organic acids is being investigated.)

5. Jagdish Chandra Ghosh Research Student. with B. P. Gyani, For Ph. D. Covered in the details of work Nos. 9, 13, 14, & 15.

POONA

Marathi

1. S. G. Talwalkar, " Humour " in relation to Marathi Drama, for Ph.D., begun on 4th August, 1950.

2. V. R. Karandikar, " Vaman-Pandit "—a study, for Ph.D., begun on 4th August, 1950.

3. P. N. Joshi, " Madhura-Bhakti " (a special type of devotion) in Marathi Literature, for Ph.D., begun on 4th August, 1950.

4. Miss Ambuja Sontakke, An edition of त्रिरत्नपुराण in देवनागरी with a linguistic and critical study theory of, for Ph.D., begun on 4th August, 1950.

5. N. B. Kavadi, " Folk Sings"—in the Dang, for Ph.D., begun on 4th August, 1950.

6. K.S. Mardikar, Dasopant and his works, for Ph.D., begun on 4th August, 1950.

7. S. A. Purandare, for Ph.D., begun on 10th January 1951.

8. G. B. Nirantar, Poetic Mind, for Ph.D., begun on 10th January 1951.

9. V. S. Kanetkar, Mysticism in Marathi Poetry, for Ph.D., begun on 22nd October 1951.

10. R. S. Walimbe, Imagery in Marathi Poetry, for Ph.D., begun on 22nd October 1951.

11. K. G. Gujarathi, Word formation in Marathi, for Ph.D., begun on 18th February 1952.

12. Y. V. Paranjpe, YogaVasistache Tatvadnyan, for Ph.D., begun on 18th February 1952.

13. D. N. Gokhale, Dr. S. V. Ketkar—a study, for Ph.D., completed on 5th April 1951.

Sanskrit

1. R. N. Gadre, " Kumaril "—a study, for Ph.D., begun on 4th August, 1950.

2. V. G. Rahurkar, History of the Families of Vedic series, for Ph.D., begun on 4th August, 1950.

3. Miss Malati Bhanu, Minor works of Sankaracharya, for Ph.D., begun on 4th August, 1950.

4. M. G. Gaydhani, Alamkaras based on similarity (Particularly Similee) in Sanskrit Drama, for Ph.D., begun on 16th February 1951.

5. Mrs. Sheelawati Oka, A Survey of the Gita Literature, for Ph.D., begun on 13th May 1951.

6. V.N. Bedekar, Studies in the vocabulary of ancient India, Medical literature, for Ph.D., beguu on 18th February 1952.

7. V.P. Mahajan, Kshemendra life and work, for Ph.D., begun on 18th February 1952.

8. Sulochana Nachane, A survey of Post Shankara Adwaita Vedanta and Philosophy of Nrsimhasraun, for Ph.D., completed on 10th January 1952.

Ardhamagadhi

1. J. D. Bhomaj, Jain Mahapuranas—a study, for Ph.D., begun on 4th August, 1950.

2. V. C. Parekh, The Rama Legand in Prakrit and allied literature, for Ph.D., begun on 4th August, 1950.

3. P. D. Rajderkar, A study of Akalanka and his work on his contribution to Jain Logic and Philosophy, for Ph.D., begun on 4th August, 1950.

Urdu

1. Prof. G. D. S. Shaikh, Development of Masnan—in Urdu poetry, for Ph.D., begun on 4th August, 1950.

Economics

1. D. B. Kulkarni, Public Finance, for Ph.D., begun on 4th August, 1950.

2. N. S. Kulkarni, Agricultural Economics, for Ph.D., begun on 4th August 1950.

3. Krishnamurthy, S. R., Industrial aspects in India, for Ph.D., begun on 4th August 1950.

4. M. S. Javadekar, Public Finance, for Ph.D., begun on 4th August, 1950.

5. B. T. Bhalerao, Economic Controls in India, for Ph.D., begun on 4th August, 1950.

6. B. D. Kanetkar, Working of the Reserve Bank of India, for Ph.D., begun on 4th August 1950.

7. V. G. Joshi, Post War Budgeting, for Ph.D., begun on 4th August, 1950.

8. S. S. Kale, Currency, for Ph.D., begun on 10th January 1951.

9. V. T. Mathews, Rent Problem in Zamindari Area, for Ph.D., begun on 10th January 1951.

10. P. S. Pathak, for Ph.D., begun on 16th February 1951.

11. S. S. Ahluwalia, for Ph.D., begun on 22nd October 1951.

12. R. S. Deshpande, for Ph.D., begun on 22nd October 1951.

13. C. T. Yeolekar, for Ph.D., begun on 22nd October 1951.

14. K. R. Mewawalla, India's Balance of International Payments, for Ph.D., completed on 18th July 1951.

Sociology

1. Miss Tapi Joglekar, The concept of Re-birth and its influence on Indian Social System, for Ph.D., begun on 4th August 1950.

2. N. C. B. Ranhaiah, Crimes in Mysore State, for Ph.D., completed on 6th December 1950.

3. Y. S. Mehendale, The Adolescent Criminal, for Ph.D., completed on 24th January 1951.

4. Freny K. Patel, Poona: a Sociological study, for Ph.D., completed on 25th January 1951.

Botany

1. S. Govindswami, Cytogenetical and Murphological studies in Musa, for Ph.D., begun on 4th August 1950.

2. Basudeo Ray, Cytogenetics of Mangoes, for Ph.D., begun on 4th August 1950.

3. Mrs. Usha Patwardhan, Born position of the Flora of Bombay State and its Origin, for Ph.D., begun on 4th August 1950.

4. U. K. Kulkarni, Botany—Mycology, for Ph.D., begun on 13th July 1951.

5. V. K. Deshmukh, Physiological Assay and some Varietal differences in Jawar, for M.Sc., completed on 8th March 1951.

6. S. Vishweshwara, Cytological studies in some members of the family Cucurbitaceae, for M.Sc., completed on 23rd January 1952.

Zoology

1. S. S. Patki, "Bionomics, Anatomy and Histology of Ariophanta Sp.", for M.Sc., begun on 4th August, 1950, completed on 4th August 1952.

2. M. S. Narayane, Zoology, for M.Sc., begun on 22nd October 1951.

3. S. G. Nadkarni, Zoology, for M.Sc., begun on 22nd October 1951.

4. R. V. Sovani, Parasitic Nematodes of the Amphibia and Replilia, for M.Sc., completed on 16th October 1950.

Mathematics

1. A. B. Shah, Special functions and set Theory, for Ph.D., begun on 4th August 1950.

2. Miss Rama Palit, Special functions, for Ph.D., begun on 4th August 1950.

3. D. W. Sontakke, Functions of real veriables, for Ph.D., begun on 10th January 1951, completed on 10th January, 1953.

4. K. S. Pathak, Pure Geometry, for Ph.D., begun on 10th January, 1951, completed on 10th January 1953.

5. G.T. Shah, Complex Variable, for Ph.D., begun on 10th January, 1951, completed on 10th January 1953.

6. K. M. Agashe, On the motion of Solids through viscous liquid, for Ph.D., begun on 22nd October 1951.

7. S. R. Anantha Rao, Distribution Function, for Ph.D., begun on 22nd October 1951.

8. N. K. Basu, Mathematical Statistics, for Ph.D., begun on 22nd October 1951.

9. M. E. Koshti, Special functions, for Ph.D., begun on 22nd October 1951.

History

1. D. K. Deshpande, Ramachandrapant Amatya, for Ph.D., begun on 4th August 1950.

2. G. B. Mench, Conditions of the people of Maharashtra during Shivaji's time, for Ph.D., begun on 4th August 1950.

3. C..S Natu, The Social condition during the Moghul Period with special reference to the standard of living, for Ph.D., begun on 16th February 1951.
4. M. V. Sahasrabuddhe, Maratha War of Independence (1680—1707), for Ph.D., begun on 22nd October 1951.

5. R. S. Barkat, Abdul Fazl and his historical works for Ph.D., begun on 18th February 1952.

6. M. V. Sahasrabuddhe, Maratha War of Independence, for Ph.D., on 18th February 1952.

Experimental Psychology

1. Mrs. Yashodara Vaidya, Imagination in Pre-school Children, for Ph.D. begun on 4th August, 1950.

Physics

1. N. R. Gokhale, Colloid—Optics, for Ph.D., begun on 4th August, 1950.

2. P. V. Hatvalne, Molecular Physics in relation to thermal Repalsion, for Ph.D., begun on 4th August, 1950.

3. R. V. Naik, Studies in self reversal of spectrod lines, for Ph.D., begun on 10th January 1951, completed on 10th January 1953.

4. V. L. Purohit, Studiesi n Raman Effect, for Ph.D., begun on 13th July 1951.

5. A. S. Parasnis, Photo effects in discharge through gases, for Ph.D., begun on 22nd October 1951.

6. M. S. Pimpalkhare, Design of Electric meter for detection of Reinforcement in R. C. C. Structures, for Ph.D., begun on 22nd October 1951.

7. P. K. Katti, Studies in Colloid Oplics, for Ph.D., completed on 21st April 1950.

Chemistry

1. P. G. Kulkarni, Carccature of physical properties of milk with reference to Viscosity, for M.Sc., begun on 17th November, 1950, completed on 16th November, 1952.

2. P. D. Aphale, Thizotropy of carbon black suspension in mineral and vegetable oil, for M.Sc. begun on 17th November, 1950, completed on 16th November, 1952.

3. V. A. Saraf, Subject in Kinetics of reactions, for M.Sc. begun on 17th November 1950, completed on 16th November 1952.

4. P. S. Dani, Electrolytic oxidation of magnesium salts for M.Sc. begun on 17th November, 1950 completed on 16th November 1952.

5. A. S. Rajadhyaksha, Mechanism of reaction of benzoyl peroxide and iodine in xylene, for M.Sc., begun on 17th November 1950, completed on 16th November, 1952.

6. M. A. Joshi, Shidies in Solray Process, for M.Sc., begun on 17th November, 1950, completed on 16th November, 1952.

7. Miss Joshi, Synthesis of aqaricer acid and relative substance, for M.Sc., on 17th November, 1950, completed on 16th November, 1952.

8. Miss Parkhi, Synthesis of antirachitic substances, for M.Sc., begun on 17th November 1950, completed on 16th November, 1952.

9. Kanchur, Studies of completed salts, for M.Sc., begun on 17th November, 1950, completed on 16th November 1952.

10. R. N. Deshpande, Carbohydrates, for M.Sc., begun on 17th November, 1950, completed on 16th November, 1952.

11. V. K. Phansalkar, Dipole moment molecular structure, for M.Sc., begun on 17th November 1950, completed on 16th November, 1952.

12. M. P. Agni, Potentiometric tibrations, for M.Sc. begun on 17th November 1950, completed on 16th November 1952.

13. C. M. Deshpande, Nature of Chemical Bond, for M.Sc., begun on 17th November, 1950, completed on 16th November 1952.

14. Khasgiwale, Emulsions, for M.Sc. begun on 17th November 1952, completed on 16th November 1952.

15. M. G. Marathey, Structure and Constitution of flavones and flavonols, for Ph.D., begun on 17th November 1950, completed on 16th November, 1950.

16. J. M. Athavale, Structure and Constitution of furo-flavones and furo-flavonols, for Ph.D., begun on 17th November 1950, completed on 16th November 1952.

17. H.K. Pendse,Condensation products of gallic and tannic acids,for Ph.D., begun on 17th November 1950, completed on 16th November 1952.

18. T. R. Ingale, Chemistry of Carbohydrates, for Ph.D., begun on 13th July 1951.

19. M. G. Badve, Study of Thixobrolg of non-newtoniasm, for Ph.D., begun on 13th July 1951.

20. S. B. Barve, Chemistry, for M.Sc., begun on 22nd October 1951.

21. S. K. Bawa, Chemistry, for M.Sc., begun on 22nd October 1951.

22. D. S. Bendale, Physical Chemistry, for M.Sc., begun on 22nd October 1951.

23. K. G. Divekar, Physical Chemistry for M.Sc., begun on 22nd October 1951.

24. G. N. Gidwani, Physical Chemistry, for M.Sc., begun on 22nd October 1951.

25. R. K. Hulyalkar, Physical Chemistry, for M.Sc., begun on 22nd October 1951.

26. P. K. Godbole, Organic Chemistry, for M.Sc., begun on 22nd October 1951.

27. P. P. Joshi, Bio-Chemistry, for M.Sc., begun on 22nd October 1951.

28. M. V. Kulkarni, Physical Chemistry, for M.Sc., begun on 22nd October 1951.

29. G. M. Limaya, Physical Chemistry, for M.Sc., begun on 22nd October 1951.

30. Usha M. Paranjpe, Organic Chemistry, for M.Sc., begun on 22nd October 1951.

31. K.Z. Patil, Organic Chemistry, for M.Sc., begun on 22nd October 1951.

32. K. S. Raghavan, Agricultural Chemistry, for M.Sc., begun on 22nd October 1951.

33. S. V. Pingle, Physical Chemistry, for M.Sc., begun on 22nd October 1951.

34. M. M. Shah, Physical Chemistry, for M.Sc., begun on 22nd October 1951.

35. S. V. Phansalkar, Bio-Chemistry, for Ph.D., begun on 22nd October 1951.

36. M. G. Kelkar, Chemistry, for Ph.D., begun on 18th February 1952.

37. S. A. Vasavada, Chemistry, for Ph.D., begun on 18th February 1952.

38. M. D. Bhatawadekar, Kinetics of Reactions in liquid-liquid Hatrogenious Systems, for M.Sc., completed on 22nd May 1950.

39. N. D. Ghatge, Chemical Analysis of Moonordica Charautiai, Seeds and the flesh of Monitor lizard, for M.Sc. begun on 3rd January 1950.

40. G. D. Kalyankar, Chemical analysis of the eggs of Guinea fowl, Country Hen and Common Pigeon, for M.Sc., completed on 3rd March 1951.

41. V. R. Keskar, Dehydration of castor oil, for M.Sc., completed on 10th April 1951.

42. M. G. Marathe, Structure and Constitution of flavones and flavonals, for Ph.D., completed on 6th February 1952.

43. P. G. Tulpule, Studies in fat Metabolism, for Ph.D., completed in 22nd April 1951.

44. J. V. Joshi, Chemical analysis of the flesh of Cuttlefish, Rhabdocynthis, Chicati kind and Prawn and Vitamin B and vitamin C contents of local leafy vegetables, for M.Sc., completed on 21st October 1951.

45. M. G. Potdar, Electrochemical preparation of Barium hypochlorite and chlorate and electrolytic Oxidation of Barium chlorate and Perchorate, completed on 27th February 1952.

46. M. V. Kunte, Studies in the moisture absorption of Gul in Storage, for M.Sc., completed on 8th October 1951.

47. R. V. Ghate, Studies in Chemotherapy, for M.Sc., completed on 4th December 1951.

48. V. K. Powar, Chemical analysis of fresh water fishes in Kolhapur, for M.Sc., completed on 15th January 1952.

49. V. K. Phansalkar, The Dicktric Constant and Molecular Structure, for M.Sc., completed on 2nd March 1952.

Education

1. K. V. Panse, Effect of Supplemented diet on the Physique of School Children, for Ph.D., begun on 10th January 1951, completed on 10th January 1953.

Politics

1. G. K. Wagdarikar, Indian Political thought during the last 100 years, for Ph.D., begun on 10th January 1951, completed in 10th January, 1953.
2. M. V. Madane, The development of the Public services in India from 1854, for Ph.D., begun on 10th January 1951, completed on 10th January 1953.
3. P. M. Potdar, Party System with reference to India, for Ph.D., begun on 10th January 1951, completed on 10th January 1953.
4. N. R. Inamdar, Election to Indian Legislature—1920 to 1946, for Ph.D., begun on 10th January 1951, completed on 10th January 1953.
5. B. R. Patne, Organizations and Functioning of Political parties in India from 1914 to 1947, for Ph.D., begun on 10th January 1951, completed on 10th January 1953.
6. G. N. Sharma, H. J. Laski, for Ph.D.
7. S. P. Sohoni, Working of the Bombay Legislature from 1921 to 1949, for Ph.D., begun on 22nd October 1951.

Agriculture

1. S. L. Manjrekar, Viral Disease in Sheeps and Goats, Rickettesis with special reference to Disease. Condition caused by them in sheeps and goats, for M.Sc., begun on 10th January 1951, completed on 10th January 1953.
2. P. D. Dikshalkar, Reserving of Deccan Village for M.Sc. begun on 16th February 1951, completed on 15th February 1953.
3. J. P. Mascarnshas, Influence of Phosphate on the growth and sucrose formation of sugarcane, for M.Sc., begun on 16th February 1951, completed on 15th February 1953.
4. D. S. Bawaja, Army and the Farmer for M.Sc., begun on 18th May 1951, completed on 17th May 1953.

5. V. V. Tembhekar, Factors determining the quality of gul and measures to improve the same, for M.Sc., begun on 18th May 1951, completed on 17th May 1953.

6. M. V. Divekar, Mineral Nutrition of Sugarcane varieties, for M.Sc., begun on 18th May 1951, completed on 17th May 1953.

7. M. K. Moolani, Agriculture, for Ph.D., begun on 22nd October 1951.

8. M. V. Gupte, Agricultural Botany, for M.Sc., (Agri.) begun on 22nd October 1951.

9. A. V. Jahagirdar, Progressive farming in the Deccan canal Tract with its history from the beginning of the 20th Century, for M.Sc.(Agri.), begun on 22nd October 1951.

10. S. D. Janorkar, Agriculture, for M.Sc.(Agri.), begun on 22nd October 1951.

11. J. P. Mirikar, Agriculture, for M.Sc.(Agri.), begun on 22nd October 1951.

12. T. C. Motwani, Agriculture, for M.Sc.(Agri.), begun on 22nd October 1951.

13. R. H. Yakhmi, Agriculture, for M.Sc. (Agri.), begun on 22nd October 1951.

14. S. S. Patil, Agriculture, for Ph.D., begun on 18th February 1952.

15. C. J. Kulkarni, for M.Sc.(Agri.), begun on 18th February, 1952.

16. D. S. Narkhede, Agricultural Economics, for M.Sc.(Agri.), begun on 18th February 1952.

17. P. S. I. Shreenivasan, Agricultural Meteorology, for Ph.D., begun on 18th February 1952.

18. Y. S. Kulkarni, Some researches on Bacterial Diseases of plants in India, for Ph.D., completed on 1st February 1951.

A. K. C.

1. G. Ac. Delury, The Cult of Vithoba—an archeological and ethnological study, for Ph.D., begun on 10th January 1951.

English

1. A. K. Bhagwat, Characterization in Modern English Novel, for Ph.D., begun on 10th January 1951.

2. R. K. Kanburkar, Meadows Taylor—His Life and Works, for Ph.D., begun on 10th January 1951.

3. N. W. Ghaskadbi, Stephen Spendar, for Ph.D., begun on 10th January 1951.

4. D. G. Natu, Keats and the Romantic theory of poetry, for Ph.D., begun on 10th January 1951.

5. M. G. Budhisagar, The Art and Thought of Aldom Huxly, for Ph.D., begun on 16th February 1951.

Biochemistry

1. M. V. Patwardhan, Studies in biochemical changes in liver injury, for Ph.D., begun on 10th January 1951.

2. P. G. Tulpule, Studies in Fat Metabolism, for Ph.D., begun on 10th January 1951.

3. S. S. Phatak, Studies in Hydrogenated fats with special reference to toxicity of Nickel and Nutrition Value of iso-olcic acid, for Ph.D., begun on 16th February 1951.

4. S. G. Kulkarni, Studies in Fermentation of Brganic waste materials, for Ph.D., begun on 13th July 1951.

5. T. J. Boman, The Vitamin Requirements of Lactic Acid Bael from Indian Curds and the study, for Ph.D., begun on 13th July 1951.

6. T. J. Boman, Vitamin requirements of Lactic Acid Bacteria found from Indian Curds and their uses for Microbiological Assay, for Ph.D., completed on 17th September 1951.

7. S. S. Phatak, Studies in Hydrogenated fats with special reference to Toxicity of Nickel and Nutritive value of iso-oleic acids, for Ph.D., completed on 14th September 1951.

Geology

1. P. D. Dhepe, Geology of Goa, for M.Sc., begun on 10th January 1951, completed on 9th January 1953.

2. L. V. Agashe (Teacher), Study of Dyke rocks in Deccan Trap, for Ph.D., begun on 18th May 1951.

3. S. S. Ghodake, Geology of Southern parts of Dist. Ratnagiri, for M.Sc., completed on 3rd February 1951.

Psychology

1. Miss Kusum Taikar, Rgrochach's Technique and its role in the evolution of biological and cultural components in mental disorder, for Ph.D., begun on 13th July 1951.

2. N. V. Patwardhan, Problem of Indiscipline in Poona Schools, for Ph.D., begun on 22nd October 1951.

Philosophy

1. T. G. Kalghatgi, Philosophy, for Ph.D., begun on 22nd October 1951.

Linguistics

1. M. Natarajan, Nominal stem Formation in Old Indo-Aryan, for Ph.D., begun on 22nd October 1951.

Commerce

1. Miss Usha K. Pandit, for M.Com., begun on 22nd October 1951.

Law

1. R. B. Shiralkar, Insanity in Law, for LL.M., begun on 22nd October 1951.

Metallurgy

1. K. N. Kinkar, Metallurgy, for M.E., begun on 18th February 1952.

Horticulture

1. B. B. Surti, Studies in rooting of decidus cuttings of mulberry as influenced by external factors, for M.Sc.(Agri.), completed on 12th August 1950.

Bacteriology

1. S. L. Manjarekar, Rickettsiosis in Sheep and Goats in the State of Bombay, for Ph.D., completed on 18th May 1951.

RAJPUTANA

Hindi

1. Megh Raj Verma Mukul, The Niranjani Sect of Rajasthan ; Its Philosophy and Literature, for Ph.D., begun in 1950, completed in 1953.

2. Motilal Meneria, The contribution of Rajasthani to Brij Bhasa Literature (Rajasthan Ka Pingal Sahitya), for Ph.D., begun in 1950, completed in June, 1952.

3. Bhola Shankar Vyas, " The Scope of Vanjana and Dhawani," for Ph.D., begun in 1950, completed in June 1952.

4. Gayatri Devi Vaish, Adhunik Hindi Kavita Me Samaj, for Ph.D., begun in 1950.

5. Narpat Chand Singhvi, " The two Rajas—Raja Shiv Prasad 'Sitara Hind' and Raja Laxman Singh—Their contributions to the evolution of Modern Hindi Language and Literature and their influence in moulding the various trends in Modern Hindi," for Ph.D., begun in 1950, ended in 1953.

6. Madhodas Vyas, " Evolution of the Concept of Kavya Doshas ", for Ph.D., begun in 1950, completed in 1953.

7. Sohan Lal Lodha, " Adhunik Hindi Sahitya Ki Prerak Shaktiyan ", for Ph.D., begun in 1950, completed in 1953.

8. Venkat Sharma, " Adhunik Hindi Sahitya men Samalochana Ka Vikas," for Ph.D., begun in 1951, completed in 1953.

9. Brijmohan Sharma, " The making and Development of Hindi Prose," for Ph.D., begun in 1951, completed in 1953.

10. Mrs. Sita Handa, A critical study of the evolution of Short story in Modern Hindi Literature, for Ph.D., begun in 1952, likely to be completed in 1954.

11. Miss Madhuri Dube, " Hindi Gadhya Ka Vaibhav Kal (1925 to 1950), for Ph.D., begun in 1952, completed in 1953.

12. Hari Krishna Purohit, " Trends of Thought in Hindi Literature 1870 to the present day," for Ph.D., begun in 1950, completed in 1952.

13. Hardutta Saraswat, " Rajasthani Sant Poets," for Ph.D., begun in 1950, completed in 1953.

Economics

1. Swarupchand Mehta, " Consumers Co-operation in India," for Ph.D., begun in 1950.

2. Harishchandra Saxena, " The Land Revenue " Policy in India with

special reference to the recent reforms, for Ph.D., begun in 1951, completed in 1953.

3. Gulab Singh Sekhawat, " Growth of Indian Banking System since World War II together with proposal for its reforms," for Ph.D., begun in 1951, completed in 1953.

Political Science

1. Rameshwar Prasad Sharma, " Development of Administrative system in Rajputana State from 1860 to 1935, for Ph.D., begun in 1950.

2. Santosh Kumar, Indian Civil Service, for Ph.D., begun in 1952, likely to be completed in 1954.

3. Harishchandra Batra, Relations of Jaipur State with the East India Company, for Ph.D., begun in 1952, likely to be completed in 1954.

Sanskrit

1. Laxmi Narain Sharma, " Rishis of Reg. Vedas ", for Ph.D., begun in 1950.

2. Panchanan Sharma, First Man in Vedas, for Ph.D., begun in 1952, likely to be completed in 1954.

3. Gangadhar Bhatta, Shaivaism and Shaktism, for Ph.D., begun in 1952, likely to be completed in 1954.

Commerce

1. Pushkernarain Mathur, " Cottage Industries in Rajasthan," for Ph.D., begun in 1950.

2. Narottam Dass Gupta, " Marketing in Rajasthan including Ajmer-Merwara," for Ph.D., begun in 1951, completed in 1953.

3. Dool Singh, " Wealth and Welfare of Shekhawati," for Ph.D., begun in 1951, completed in 1953.

Philosophy

1. Brahmanand Purohit, " Philosophy of R. G. Collingwood," for Ph.D., begun in 1950, ended in 1953.

2. Ladu Ram Joshi " Idea of God (Indian Philosophy), for Ph.D., begun in 1950, completed in 1952.

3. Gopal Behari Mathur, " Modern Psychological Analysis and Religious values," for Ph.D., begun in 1950, completed in 1952.

4. Ishwar Chandra Sharma, " Terapanthi Sect of Jains," for Ph.D., begun in 1950, completed in 1952.

5. Mahaveer Prasad Vyas, " Indian Conception of Values," for Ph.D., begun in 1952, completed in 1953.

6. Sudershan Sharma, " American Pregmatism in its relation to the Pragmatics, for Ph.D., begun in 1951, completed in 1953.

The following subjects are also under research: (*i*) Critical Humanism. (*ii*) Comparative Philosophy. (*iii*) Values. (*iv*) Psychological Analysis of Religious values. (*v*) Therapanthi Sect of Jainism. (*vi*) Conception of God in Indian Philosophy. (*vii*) Comparative Study of Indian and American Pragmatism. (*viii*) Indian Conception of Values.

Zoology.

1. Harischandra Bhartia, " Enquiry into the effects of fixation Dehydration and imbedding on animal cells," for Ph.D., begun in 1950, ended in 1953.

2. B. K. Balkrishna Menon, " A study of Bionomics and comparative Morphology of the common Acrede dal found in central Rajasthan," for Ph.D., begun in 1952, likely to completed in 1954.

Chemistry

1. Ram Sahai Saxena, (*i*) Studies on the composition of Ferric ferrocyanide and ferrous ferricyanide by Physico-Chemical methods such as conductometry (Potentiometry and Thermometry, (*ii*) Investigation's on the Colloidal behaviour of these compounds and Correlation of their properties with their composition. (*iii*) Preparation of the so called soluble and insoluble Ferri ferrocyanide and Ferrous ferricyanide and their industrial uses. for Ph.D., begun in 1950, completed in 1952.

2. Jagdish Narain Gaur, " Physico-chemical studies on the composition of Complex Metallic Ferro and Ferricy-anides " for Ph.D., begun in 1951, completed in 1953.

3. A. P. Shitoot, Joshi Effect—Comparative distribution of the effect of light in the current frequencies produced by vapour and gases under electric discharge, for Ph.D., begun in 1952, likely to be completed in 1954.

4. K. S. Sriniwas, Synthetic Drugs, (Anti-Malaria), for Ph.D., begun in 1952, likely to be completed in 1954.

English

1. Dinendra Kumar Dutta, " Mathew Arnold and the XXth Century" for Ph.D., begun in 1950, completed in 1953.

2. Ghan Shyam Singh, " Note of Pessimism in Victorian Poetry, for Ph.D., begun in 1950, completed in 1953.

Medicine

1. B. M. Mittal, Investigation of Medicinal Plants (Specific plants), for Ph.D., begun in 1951, completed in 1953.

2. P. R. Pabrai, Investigation of Medicinal Plants (Specific plants), for Ph.D., begun in 1951, completed in 1953.

3. P. C. Dandia, Chemical Pharmacognestical and Pharmacological Investigations of Indian Medicine Plants, for Ph.D., begun in 1952, likely to be completed in 1954.

Botany

1. N. Chandra Sekharan Nair, Effect of the Magnetic Field and Electrical current on Organisms which are in an active state of growth, for Ph.D., begun in 1951, completed in 1953.

2. Kewal Chand Jain, Systematic Investigation on the Morphology Anatomy of the grasses of Rajputana, for Ph.D., begun in 1952, likely to be completed in 1954.

3. B. P. Vankataraman, Historlogical and Ecological Studies on Tuberous roots of Indian desert plants, for Ph.D., begun in 1952, likely to be completed in 1954.

History

1. Mrs. Indira Shekhar, Mughal Influences in Rajputana (16th Century on-wards), for Ph.D., begun in 1952, likely to be completed in 1954.

Geology

1. Mukandwaman Chaudhari, The study of the Pegmatics of Mewar, for Ph.D., begun in 1951, completed in 1953.

2. Omkar Singh, The Geology and Tectonics of Chittore Area for Ph.D., begun in 1951, completed in 1953.

SAUGAR

Physics

1. C. S. Bhatnagar, Research Scholar, Studies in Electrets, for Ph.D., begun in July 1950, papers published in Sagar University Journal, and in Proc. Ind. Acad. Sciences (The electrical conductivities of different types of carnuba wax have been studied under different conditions of varying applied voltages and different temperatures so as to threw light on the machanism of electret formation.)

2. Parsruamaiah, Research Scholar Spectroscopic study of trace elements in plants different Species of grass, for Ph.D., begun in July, 1951. (Methods of spectrochemical analysis are being utilised in the study of trace elements in plants. The plants are studied in different stages of growth. So also different components of the same plants are also analysed.)

3. J. K. Zope, Research Scholar "Soil Physics," for Ph.D., begun in August, 1952.

4. R. K. Shrivastava, Lecturer Studies on Lenard Phosphors for Ph.D., begun in January, 1952. (The role of flux in the Lenard phoshpors is being studied under different conditions of concentration of the activator with a view of investigating into the mechanism of Luminescence.)

Chemistry

1. Dr. A. K. Bhattacharya, Head of Department with N. R. Subharatnam and K. V. Narayan Rao and P. N. Awasthi, Central Government Research Scholars, (*i*) Studies in thermal and Photo chemical reactions involving Iodine in solutions in different solvents, for Ph.D., begun in June, 1950, completed in May, 1953, Published in Journal Saugar University. (A new point about "activating the so-called "inactive" solvents have been tried with mixed solvents. The absorption spectra, is being studied along with other physical properties to explain the nature of mechanism of reactions involving halogens in solutions.)

   (*ii*) Photochemical reactions with special reference to primary process, for Ph.D., begun in June, 1950, completed in May, 1953, Published in Journal Saugar University. (Photochemical reactions in shages are being studied with special reference to halogeny. Attempts are being made to assign definite mechanism for the primary and secondary changes. Measurements of dipolemoments, conductivity PH. value and Band spectra are being taken up for the illucidation of the mechanism.)

   (*iii*) Soil Nitrification, for Ph.D., begun in July, 1952, likely to be completed in May, 1955.

2. Dr. S. N. Banerji, Senior Lecturer with R. D. Dave, University Research Scholars, (*i*) Studies in Soap Sols, for Ph.D., begun in July, 1950, completed in July, 1953, Published in Saugar University

Journal. (Soap sols have been investigated by many workers from various paints of views. A new approach to some of the physical properties of soap sols is being studied from the paint of view of aggregation and orientation of the colloid particles to form a labik structure.)

3. Y. G. Kher, University Research Scholar, Studies in some lyophilic colloids, for Ph.D., begun in July, 1950, completed in June, 1953, Published in Saugar University Journal. (Viscosity has been supposed to be an important property to distinguished a reversable colloid from a irresursabll one. It has been found that there exist a great anonamaly in this physical property. In order to investigate how far the viscosity of sols is associated with their other properties studies are being made on some reversable sols.)

4. O. N. Tripathi, University Research Scholar, Optmium conditions for soil fertility, for Ph.D., begun in July, 1951, likely to be completed in June, 1954. (Investigations are being carried on the processesity which the nitrogen content of the soil is increased and the optimum conditions for bringing this effect.)

Botany (Ecology.)

1. R. Misra (Reader) and N. K. Joshi The Forest-complex of Patharia Hills, begun in July, 1950, completed in October 1951, Published of Journ. Ind. Bot. Soc. XXXI, No. 3. (Factors responsible for growth in mixed forests at Sagar have been examined. It is found that no single species possesses as wide ecological amplitude as to grow into extensive pure stands.)

2. R. Misra (Reader), Modern Trends in Plant Taxonomy—Ecological stand, begun in October 1950, completed in December 1951, Published in Proc. Ind. Sc. Congress 1951. (The nature of ecotypes and vicarious species has been discussed.)

3. S. C. Pandeya (*i*) Succession in grasslands of Sagar, begun in July 1950, completed in October 1951. Published in Saugar Univ. Vol. I. (Soil development and succession of grassland communities have been correlated. Some valuable fodder grasses have been assigned definite ranks in the scheme of succession.)

   (*ii*) Ecology of grasslands, for Ph.D., begun in July, 1950, completed in December 1952. Phytosociological values in relation to environmental factors in grassland communities of Saugar have been worked out. Autecology of a few important grasses and their chemical analysis have also been included.)

4. M. P. Shrivastava, Autecology of Helandia Latebrosa, for M.Sc. (Part), begun in October 1950, completed in April 1952. (Reproductive capacity, growth, dispersal and habit of the species have been worked out in relation to the environment.)

5. D. K. Tiwari, Association between grasses and legumes, for M.Sc. (Part), begun in October 1950, completed in April 1952. (Association

indices between grass and legumes species in the grasslands of Sagar have been found out in relation to moisture and soil factors.

6. V. S. Sharma, Ecological study of the vegetation of stream beds of Sagar, for M.Sc.(Part), begun in October 1950, completed in April, 1952. (Plant communities in relation to the nature of the substratum and duration for which it is exposed have been studied in two hill streams of Sagar.)

7. L. P. Mall, (Lecturer), Notes on Autecology of Cassia tora L. and C. obtusifolia, L., begun in August 1950, completed in September, 1952. (Cassia tora L. & C. Obtusifolia L., are two distinct species on account of distinct morphological characters. Their lime content is also different.)

(**Mycology**)

1. S. B. Saksena, (Lecturer), Studies in soil and aquatic fungi of Sagar, for Ph.D., begun in 1950, completed in 1953. (The soil factors are being studied of various soil samples and their fungal flora is being isolated and studied. One new genus has been discovered which is ready for publication and will be sent soon. Certain soil fungi are collected for the first time from India.)

2. R. K. Grover, Follicolous fungi of Sagar, for M.Sc. (Part), begun in October 1950, completed in April 1952. 54 foliicolous fungi have been described. Some of them are new on certain hosts and a few reported for the first time.

3. G. Krishnamurthy, Study of soil fungi in relation to some edaphic for M.Sc.(Part), begun in October 1950 completed in April, 1952. (Samples of soil from forest and fields were analysed and tested for pH, Carbonate content. Organic carbon, Nitrate content, Base deficiency and water content, 3 spp., were reported for the first time from Indian soils.)

(**Floral Anatomy**)

1. H. R. Bhargava, (Lecturer), The anatomy of the flower of Boerbaavia repanda Willd, completed in November 1951, Published in The American Midland Naturalist Vol. 47, No. 2. The (Vascular supply to the various floral organs has been described the apparently basal ovule has been found to be lateral.)

(**Morphology**)

1. S. N. Dixit, Contributions to the life history of Amaranthus spinosus, for M.Sc.(Part), begun in October, 1950, completed in April, 1952. (The anatomy of the vegetative parts and the life history of Amaranthus Spinosus has been studied.)

(**Cytology and Cytogenetics**)

1. Y. Sundar Rao, (Lecturer), The Karyo-systematic studies in Helobiae, Leguminosae and certain other genera, for Ph.D., begun in 1950,

completed in 1952 (a part has been completed and the rest will be completed within one year.) Short Notes published for the sake of Scientific priority, Published in the chromosomes of Scilla indica, Curr. Sci., (*i*) A study of Cytology of the following families—Butomaceace, Alismataceae Hydrochacitaceáe, Najadaceae, etc. (*ii*) A cytageographical study of Ottelia alismoides, which exists in different chromosome numbers. (*iii*) The cytological study of the genus Crotalaria and Sesbania. (*iv*) A study of the wild relatives of the cultivated Sesbania bispinosa ($2n = 24$). A diploid with $2n = 12$ which grows wild has been discovered and its relationship with the cultivated letraploid is being studied. (*v*) A study of the Colehicine induced tetraploidy in the diploid S. B.—*ispinosa* ($2n = 12$) with a view to understand the mode of origin of the cultivated tetraploid. (*vi*) Artificial induction of polyploidy in *Sunn Hemp* to explore the economic possibilities of the tetraploid *Sunn Hemp*, which is a source of valuable fibre (This may take one year more). (*vii*) A crytogeographical study of *Scilla indica* and the mode of geographic distribution of the different chromosome races.)

(**Algae.**)

1. T. V. Desikachary, (Lecturer), (*i*)Diatam wall structure as revealed by the Electron microscope (with frontispiece and preliminary note)., begun in July, 1951, completed in March, 1952, Published in J. C. S. I. R., May 1952. (The study of the diatom wall structure needs more and more of special optical equipment and the introduction of Electron microscope has helped in this study. Many genera have been studied and others are being studied.)

(*ii*) Electron microscope study of the Diaton Wall structre, begun in July 1951, completed in March, 1952, Published in J. C. S. I. R., 1952. (The study of the diatom wall structure needs more and more of special optical equipment and the introduction of Electron microscope has helped in this study. Many genera have been studied and others are being studied.)

Geology

1. K. C. Dubbey, Post-graduate, Geology of the area around Heerapur, Saugor Distt. (M. P.), for M.Sc., begun in 1951, completed in 1952. (The work consists of mapping and regional study of the Geology of the area around Heerapur, Saugor District. The rock formations exposed are the Bundelkhand granite and schist, Limestones and shales of Bijawar series with associated iron ore and Hornstone Breccia, followed by conglomerate and Sandstone of the Upper Rewa horizon. The Bundelkhand granite is traversed by coarsely gabbroid dykes.)

2. P. N. Jagtap, Post-graduate, Geology of the area around Shahgarh, Saugor Distt., (M.-P.), for M.Sc., begun in 1951, completed in 1952. (Study of the area around Shahgarh, in the north of Saugor District has shown the occurrence of Bundelkhand complex consisting of granites and schists traversed by veins and pegmatites and basic dykes. These are followed by Bijawar Quartzite and local representatives of the Series including shales, sandstones and conglomerate, Kaimur

shales and ferruginous sandstones succeeded by conglomerates, sandstones, shales and ferruginous sandstones of the Rewa Series, iron ore is also developed on a moderate scale.)

English

1. S. R. Swaminathan, Teacher, Keats and Shelley, comparative Studies in Two Types of Poetic Imagery and Diction, for D.Phil., begun in 1951, completed in 1953. (An analysis of the present element its reflection in imagery and diction.)

2. P. S. Sastri, (Teacher), Emotional Rhythms and Sympolism in the Poetry of Coleridge. (An enquiry into the sources of the creative imagination.)

3. A. Datta, (Teacher), Study in Words worth with spl. ref, to his Imagery and Diction, begun in 1951.

4. A. Mukherji, (Teacher), Western influence on Bengali Drama. A study in the impact of ideas, for D.Litt., begun in 1952, likely to be completed in 1954. (An enquiry into the nature and influence of Western dramatrugy on Bengali plays during 1880—1940.)

Hindi

1. Shivaraj Singh, *Hindi Alochana ka Bikash.* (*in Hindi*) for Ph.D., begun in 1949, and completed in 1952.

2. Gangadhar Jha, *Adhunik Manovaiganik Tatha Rajnaitik Sidhantha aur Hindi parunaka Prabhab.* (*in Hindi*) for Ph.D., begun in 1949 and completed in 1952.

3. Sirendra Kumar Shukla, *Bharatendu ka Natak Sahitya.* (*in Hindi*) for Ph.D., begun in 1950 and completed.

4. M. S. Vakhale, *Sur aur unka Kavya.* (*in Hindi*) for Ph.D. begun in 1950, to be completed in 1953.

5. U. S. Shukla, *Premchand ke Paschat Hindi Kahaniyan.* (*in Hindi*) for Ph.D., begun in 1951, to be completed in 1953.

6. S. N. Choubey, *Premchand ke Paschat Hindi Upanayas.* (*in Hindi*) for Ph.D., begun in 1951, to be completed in 1953.

7. Mrs. S. Khare, *Prasad ke Paschat Hindi Natak.* (*in Hindi*) for Ph.D., begun in 1951 to be completed in 1953.

8. Prem Shankar Tewari, *Prasad ka kavpa.* (*in Hindi*) for Ph.D., begun in 1950 and completed.

9. Mahendra Mohan Sharma, *Hindi men Samiksha Sidhanton ka Bikas 1860 tak.* (*in Hindi*) for Ph.D., begun in 1952, to be completed in 1954.

10. Prof. R. L. Singh, Teacher, *Acharjya School ke Shamikshya Sidhanta.* (*in Hindi*) for Ph.D., begun in 1951, to be completed in 1953.

11. Prof. K. K. Pathak, Teacher, *Guptajee ka kavya.* (*in Hindi*) for Ph.D., begun in 1951, to be completed in 1953.

Sanskrit

1. Dr. V. M. Apte, M.A., Ph.D., (Cantab.), Reader and Head of the Department, (*i*) Indra as a God of Light in the Rigveda, Published already in 1952, in Journal of the Saugar University.

   (*ii*) The Bhagvad-Gita as its own Commentary, begun in 1949, Press copy ready in 1951, October. (This is an analysis of the teachings of the Gita in its own words.")

   (*iii*) The Agni Hymns in the R.V. (Mandal VI) translated and annotated begun in 1951, likely to be completed in October, 1953.

2. Work of Ph.D., students under the guidance of the Head of the Dept., (*i*) Studies in the Bhagwata Purana, begun in September, 1952, likely to be completed in 1954.

   (*ii*) Studies in the Ramayana (Early Literature referred to therein, etc.), begun in March 1952, likely to be completed in 1954.

   (*iii*) Character-types in Sanskrit plays, begun in September, 1952, likely to be completed in 1954.

   (*iv*) Rigveda Mantras in the Aitreya Brahmana, begun in June, 1950, likely to be completed in 1953.

   (*v*) Goddesses in the Rigveda (Mythological studies), begun in September, 1952, likely to be completed in 1954.

Marathi

1. D. L. Adoni, Lecturer, "Semantic study of Early Marathi Literature," for Ph.D., begun in 1950, likely to be completed by the end of 1953, 'Jnaneshwari' edited by Rajwade is taken as the basic Text.

   An investigation into the new orientations and shifts of the meanings of words occurring in 'Jnaneswari' (particular) and in earlier and later literature (in general)—An inquiry into the principles of Semantics revealed in the history of these words.)

History

1. Dr. H. L. Gupta, Lecturer, (*i*) British Relations with Indian States from 1805—1835., for D.Litt., begun in 1948, likely to be completed in 1956.

   (*ii*) British Relations with Tibet and Nepal, begun in 1952, likely to be completed in 1956.

2. S. R. Mehrotra, (Lecturer), Social thought in Ancient India from 600 B. C. to 184 B. C., for Ph. D., begun in 1951, likely to be completed in 1956.

Politics

1. R. P. Shrivastava, (Teacher), Civil Services in India for Ph.D. completed in December, 1952.
2. R. N. Agarwal, Administration of Justice, for Ph.D.
3. D. C. Sharma, U. N. at work, for Ph.D.
4. B. P. Argal, Financial Administration in C. P., for Ph.D., begun in 1951.
5. U. S. Srivastava, Administration in C. P.,for Ph.D., begun in 1951.
6. B. L. Misra, Government of Madhya Pradesh (1919 to the present day), for Ph.D., begun in 1951.

TRAVANCORE

Central Research Institute

Agricultural Chemistry

1. N. Subramoney, Research Officer, Chemical and Microbiological investigations on the Acid peats of T.C. State, for Ph.D., begun in 1949, completed in 1952. (Study of the chemical and Morphological aspect of a new species of Azoto bacter.)

2. M.M. Koshy Kannan Devan, Research Scholar, Phosphate studies in Travancore-Cochin Soils, for M.Sc., begun in 1949, completed in 1952, A part published in the Bulletin of the Central Research Institute Vol. II, No. 1, series A, December, 1951. (Fractionated native soil phosphate investigated different aspects of phosphate fixation.)

3. N. Chitharanjan, Asst. Chemist, Soil Survey Scheme, Absorption of Nutrients by the Tapioca Plant, for M.Sc., begun in 1948, completed in 1952. (Studied the uptake of N.P.K. during the various stages of growth of the Tapioca plant.)

Organic Chemistry

1. P. K. Mathew, Asst. Chemist, Tapioca Research Scheme,Studies on the Food value of tuberous crops with special reference to tapioca and sweet Potatoe, for Ph.D., begun in 1949, likely to be completed in 1954. (Variation in the starch content of tubers of tapioca with age was completed in the case of eight hybrids. Further studies on the rest of the varieties are continued.)

2. K. S. Madhavan Pillai, Research Officer, Studies in the Chemistry of indigenous Drugs, (*i*) Barringtonia Racemosa Blume. (*ii*) Feronia Elephontum, for Ph.D., begun in 1952, completed in 1953, (From Barringtonia Racemosa mixture of Saponins has been isolated and they are being separately crystallised. Constitution of these are to be worked out. The native of the medical principals of Feronia Elephantum are being examined.)

3. C. S. Bhaskaran Nair, (*i*) Studies in the composition and utilization of wood tar, for M.Sc., begun in 1948, completed in 1952. (Brief abstract sent for publication in the "Chemical Age." The by-product tar produced in the producer plants of M/s. The Fertilizers and Chemicals Ltd., Aloaye, Travancore-Cochin was distilled and then separated into distinct groups of compounds such as acids bases, phenols, and neutral compounds. Each of these was fractionated and many constituents identified. Utilization of tar for production of plastics, paints and varnishes disinfectants, insecticides insulating materials and syntans has been studied and suitable formula worked out.)

   (*ii*) Study of the active principle of peteveria aliaceae, begun in 1950. (A new sulphur compound has been isolated. The constitution of this is being worked out.)

4. P. Saradamma, Research Asst., Studies in the chemistry of

Indigenous Drugs, (*i*) Cyclea burmanni (*ii*) Cycas cercinalis, for Ph.D., begun in 1951. (Continuing the work on the constitution of the two alkalaids, Burmannine and Burmanndium isolated from the tubers of cycles burmanni, Chemical investigation of the seeds of cycascercinalis, which contains two substances one of a sterolic nature and other of a glycesidic nature.)

5. K. Pankajakshy Amma, Government of India Scholar, Chemistry and Utilization of marine products especially Marine Oils, for Ph.D., begun in 1951. (Previous work on the chemistry of certain insecticides from low grade shark liver oil is being continued. Work on the glyceride constitution of the oil of certain varieties of shark is under work. The work on the oil of marine crabs has also been taken up.)

6. N. Saraswathi Bai, Studies in the chemistry of indigenous drugs, (*i*) Tiliacora racemosa. (*ii*) Helicterεs Isora. (*iii*) Courupita guianensis, for M.Sc., begun in 1949, completed in 1952. (Roots of Tiliacora racemosa stem bark of Helicteres Isora and fruits of courupita Ginanensis were examined. An alkalid and a colouring matter respectively were isolated from the first two and their properties studied. The characteristics of the oil from the fruit were determined.)

7. P. V. Annamma, Bromination and mercuriation of hydrocarbons, for M.Sc., begun in 1951, completed in 1953. (Low grade shark liver oil cracked in iron retests, the hydrocarbon obtained treated with zinc dust. The distillate brominated and fractionated. Further work under way.)

8. Anna M. Chacko, Studies in the stablization and refining of certain fish liver oils, for M.Sc., begun in 1949, completed in 1952. (Physical and chemical characteristics of certain fish liver oil like Tunny. Ray and Udumpu were examined. Next stabilization of raybil using synergistic combination of antioxidants was effected. Decdorization was also tried employing Raney nicked and palladium catalysts.)

9. C. J. Philip, Asst. Analyst, Stability studies on certain vegetable oils, for M.Sc., begun in 1948, completed in 1951, Abstract of the work was published in the Indian Soap Journal June, 1952. A note was also published in Science and Culture Jan. 1952. (*i*) Antioxidants for Coconut and Sesame oil. Many antioxidant like gallanilide, ethly gallate, organic acids, etc., were studied on the stability of the oils, by the petoxide value method.

(*ii*) Synergic action of anti-oxidants—the above oils were the substracts used. Combination of Phosphoric ascerlic acids, etc., with common antioxidants were studied. Lime juice was found to be a good antioxidant.

(*iii*) Enzymalysis as a method for the detection of adulteration in cocoanut and sesame oils with castor lipase was also investigated.)

Physical Organic Chemistry

1. R, Ananta Raman, Research Officer, Electrophilic Catalysis on substi-

tution reactions at a saturated Carbon atom, begun in 1952.(Continuation of the work submitted for Ph.D.,degree of the London University, Effect of mercuric halides on some organic substitution reactions are being worked out with a view to determine the machanism of such reactions.

Inorganic Chemistry

1. K. N. Kartha, A study of the Chemistry of Travancore Minerals with special reference to Monozite, for M.Sc., begun in 1949, completed in 1952, One paper is sent for publication in the journal of the Indian Chemical Society. (A new method of decomposition of monozite with-quick-lime and calcium chloride has been worked out. The catalytic action of the Phosphate free monozite (oxides of Thorium and rare earths) in certain organic reactions is being studied.)

University College

Physics

1. Dr. C. S. Venkateswaran, (*i*) Fine structure of scattered light. (*ii*) begun in 1938, Journal Published in the Proceedings of Indian Academy of Sciences, and in Proc. of Indian Science Congress.

2. T. C. Sebastian, Raman Spectra using U. V. radiations, for Ph.D., begun in 1951.

3. A. O. Mathai, (*i*) Radioactivity (*ii*) Instruments for Ph.D., begun in 1950, likely to be completed in 1954, Published in Two short notes in the Journal of Scientific instrument.

4. Mrs. Aleyamma George, Scattering of light in colloids, etc., for Ph.D., begun in 1947, completed in 1953, published in Journal Current Science.

5. P. T. Rajan, Spectroscopes and Spectroscopy of Th., for M.Sc., begun in 1949, completed in 1952.

6. K. Sudarsanan, Modified X-Ray Reflections, for Ph.D., begun in 1952, likely to be completed in 1956.

7. Kerala Varma, X-ray studies of Industrial fibres, for M.Sc., begun in 1952, likely to be completed in 1955.

8. S. Harijara Iyer, Intensity measurements in Raman Spectra, for Ph.D., begun in 1952, likely to be completed in 1956.

Chemistry

1. C. Krishnaswamy, (Government of India, Research Scholar), Jur. *Plant product* : Active principles of the flowers petlaphorum Ferrugineum and Fixidoil from the roots of chonemorpha Macrophylla Sterol from Nerium adorum, for M.Sc., begun in January 1949, ended in 1952. (Two crystalline products have been isolated from the flowers of p. ferrugineum and are under investigation. The chemical

and physical constants of the fixiodoil have been determined. The sterrls from Nerium odorum are being studied.)

2. K. Velappan Nair, (Lecturer), Plant products: Colouring matter from bark of the Jack tree (artocarpus integrifolia), for Ph.D., begun in 1951, completed in 1953. (A neutral crystalline product has been isolated and is under investigation.)

Botany Department

Cytogenetics

1. Dr. A. Abraham, Professor, Studies on Tapioca, begun in 1948; completed in 1953. (Studies on Manihot Utilissima and related species, from the crtological and genetical aspects.)

Morphology and Cytology

1. K.T. George, Lecturer, Studies on Gnetum, for Ph.D., begun in 1950, likely to be completed in 1955. (Study of the life history of *Gnetum scanders*.)

2. K. C. Jacob, Lecturer, Studies on the commelinaceae, for Ph.D., begun in 1952, likely to be completed in 1955. (Cytogenetical cytotaxonamical studies of a number of plants belonging to the Commelinaceae.)

3. N. J. Thomas, Lecturer, Studies on Orchidaceae, for Ph.D., begun in 1952, likely to be completed in 1955. (Cytological survey of the Orchids of Travancore-Cochin.)

4. P. K. Sadananda Panicker, Asst. Research Officer, Interspecific hydridisation in *Manihot*, for M.Sc., begun in 1949, completed in 1953. (Detailed studies on two species of *Manihot* their hybrids and back crosses.)

5. M. N. Kunjan, Asst. Research Officer, Studies on Sweet Potato, for M.Sc., begun in 1949, completed in 1953. (Studies on Ipomea batatas and other species of Ipomea.)

6. A. T. Teresamma, Studies on *Chlos ophtum*, for Ph.D., begun in 1951, likely to be completed in 1954. (Studies on several species of Chlorophytum from cytogenetical and cytotaxenomic aspects.)

7. K. Ramachandran Studies on some tuber crops of Travancore, for M.Sc., begun in 1950, completed in 1953 (Studies on several plants belonging to the Aroideae.)

Zoology

1. Dr. K. Bhaskaran Nair, Prof. Early Embryology of Decapod Crustacea, begun in 1950, likely to be completed in 1955, Work on Carisiona

Published in Proc. Ind. Acad. Sci. 1949. (Problems connected with and formation of germ layers are being investigated.

2. A. P. Mathew, Lecturer, Embryology of Scorpion Palamnacus Scaber Embryological studies in other S. Indian scorpions and Arachnids Invertebrate vivipaity, for Ph.D., begun in 1947, completed in 1952. (A comprehensive work on the whole course of development.)

3. Dr. K.K. Nair, Lecturer, (*i*) Studies on the toxonomy cytology and Physiology of gall midges, begun in 1948, likely to be completed in 1956.

   (*ii*) Metamorphosis in the fruit fly Dacus Spp., begun in 1951, completed in 1953.

   (*iii*) Endocrine organs in insects, begun in 1951, likely to be completed in 1956.

4. V. Ananthanarayanan, Lecturer, Studies on Isopod Embryology taxonomy of S. India snakes, for Ph.D., begun in 1949, completed in 1953.

5. R. Parameswara Iyer, Lecturer, Embryology of the crab Paratelphusa, for Ph. D., begun in 1949, likely to be completed in 1955.

English Literature

1. G. Kumara Pillai, Bernard Shaw, for Ph.D., begun in 1952, likely to be completed in 1954. (Bernard Shaw as a dramatic craftsman.)

Malayalam

1. C. Narayana Pillai, 'A critical study of Ramacharitam with special attention to its vocabulary and grammar, for Ph.D., begun in 1952, likely to be completed in 1954. (Ramacharitam, its importance in the study of early Malayalam literature an analysis and study of its vocabulary and grammar, etc.)

Tamil

1. C. Jesudasan, 'Survey of Tamil Literature in the Sangam period,' for Ph.D., begun in 1949, completed in 1953. (The validity of the theory of the Sangam Literature—the characteristics of the Sangam literature in general—a critical estimate of the contribution of important poets.)

2. S. Chenthiperumal, Didactic literature in Tamil, for Ph.D., begun in 1952, likely to be completed in 1954 = 55.

History and Politics

1. K. Balakrishnan Nair, Lecturer, Constitutional and Administrative development in Travancore, for M.Litt., begun in 1951, completed in 1953.

Philosophy

1. K. Sreedharan Nair, Lecturer, "The Psychology of Taboos", for Ph.D., begun in 1949, completed in 1953. (The Psychological principles underlying the various social and religious taboos found in Indian society with special reference to Kerala.)

2. N. Anantharaman, Lecturer, "Conflicts of Industry" for Ph.D., begun in 1950, completed in 1953. (The psychological causes of industrial conflicts.)

Economics

1. P. K. Idiculla, 'Labour problems in Travancore-Cochin, for Ph.D., begun in 1949, completed in 1953.

Marine Biology and Fisheries

1. Gopinath Pillai K. (*i*) Studies on the Otoliths of Indian Fishes, for Ph.D., begun in 1949, completed in 1952. (Describes the Otoliths of Indian fishes their structure and composition and how they serve as an aid in taxomony.)

(*ii*) Seasonal variation in the occurrence of commercial fishes off Cape Comorin, begun in 1946, completed in 1952. (Analyses the fish catches statistically to find out the fluctuations in the occurrence through the various months.)

(*iii*) Regeneration of the fins in fishes, begun in 1950, completed in 1951, Published in Current Science, Vol. 21, No. 6, 1952. (Describes how the various fins of fish respond to amputation.)

(*iv*) Marine Borers and fowling organisms and methods to prevent their action, begun in 1951. (Describes the destructive agents of marine pilings and fishing boats and the methods to prevent the deterioration.)

(*v*) Secondary bone formation in the occipital crests of some teleostean fishes, begun in 1949, completed in 1951, Published in Joun. Zool. Soc. India, Vol. III, No. 2, 1952. (Describes a peculiar bone formation in the skull of some fishes.)

2. Mary John, Asst. Research Officer (*i*) Anatomy of *Wallagonia attu*, for Ph.D., Skeletal system completed. (Describes the skull and various systems of the fish.)

(*ii*) Mullet fishing of the Kayamkulam lake, begun in 1947, completed in 1950. (Describes the various species of Mullets in the lake and their fishery.)

(*iii*) Fluviatile fauna of the Kayamkulam lake. (Describes all the fluviatile fauna and their bionomics.)

(*iv*) Larval development of Echenies naucrates, begun in 1948, completed in 1950, Published in Bull. Central Research Inst. Vol. I. (Describes the various stages in the development of the fish from the egg to the 48 hour stage.)

3. T. A. Mammen, Government of India Sr. Scholar, (*ii*) Hydroids of South India, for Ph.D., begun in 1950, completed in 1953. (Describes the systematics of the South Indian Hydroids.)

(*ii*) Air bladder in fishes, Investigates the Physiology of gas formation in the air bladder of certain teleostean fishes.)

4. P. R. Parameswaran Pillai, I. C. A. R., Scholar, Pests of stored fish and their control, for M.Sc., begun in 1949, completed in 1952. (Describes the various pests, both insects and mites, their life history, infestation and probable control measures.)

5. K. G. Padmanabhan, Government of India Jr. Scholar, Embroylogy of Macropods cupanus and the early larval stages, for M.Sc., begun in 1949, completed in 1952. (Describes the early embryonic development of the fish and its development after hatching.)

6. Ramavarma Raja, Trematode and Cestode parasites of commercial food fishes, for M.Sc., begun in 1948, completed in 1951. (Describes the parasites collected from various food fishes.)

7. P. J. Thomas (Part-time), Skull modification of fishes in relation to feeding habits, for M.Sc., begun in 1949, completed in 1953. (Studies the structural modifications of the head in relation to the zone and mode of feeding.)

8. J. Sethulakshmi, (*i*) Foraminifera of the Travancore coast, for M.Sc., begun in 1949, completed in 1953. (Systematically describes the foraminifera obtained from deredgings along the Travancore-Cochin coast.)

(*ii*) Morphology of a tube dwelling Polychaete. (Studies the morphology of the Polychaete.)

9. P. C. Snehalatha, Larval stages of Aquatic insects, for M.Sc., begun in 1949, completed in 1952. (The larval developments of the various aquatic insects and correlation of these larvae with their adults.)

Marine Biology and Fisheries (Crustacea)

1. N. Krishna Pillai, Government of India, Sr. Scholar, (*i*) Isoped fauna of Travancore, for Ph.D., begun in 1950, completed in 1953. (Describes the various isopods, free as well as parasitic.)

(*ii*) Anatomy of a new blind fish from North Travancore, for Ph. D., begun in 1949, completed in 1953. (Describes the morphology of the skull and other organs of a new blind fish obtained from Kottayam.)

(*iii*) Larval stages of *pericliminisgrandis*, begun in 1949, completed in 1950, Published in Bull. Central Research Inst. Vol. I. (Describes the various larval stages of the crustacea.)

Marine Estuarine Biology

1. B. V. Kurien, Fresh Water Biologist, Cumacea of the Indian Museum collection, begun in 1948, completed in 1952. (Describes systematically the Cumacea collection kept in the Indian Museum.)

(*ii*) Embryology of Gigacuma sp. (Embryology of a new genera of cumacea.)

2. G. Sivankutty Nair, Embryology of Accutrogobius japonicus, for M.Sc., begun in 1948, completed in 1952. (Describes the Embryology and larval stages of an estuarine Goby.)

Statistical Laboratory

Statistics

1. N. Gopalakrishnan Nair, Senior Technical Assistant, Matrix Methods in the Statistical Theory, for M.Sc., begun in December 1945, completed in August 1949 and accepted by the' Varsity in February 1950, Published in Bulletin of the Central Research Institute, Vol. I, No. 1, Series B. (In this Thesis he describes the application of matrices to problems in Design of Experiments. He has worked out the analysis of variance in particular designs, such as randomised block, latin square, Greaco Latin Square Split plot design etc. He has also illustrated the application of matrix methods in the theory of linear estimation and testing hypothesis.)

2. K. Bhaskara Varma Thirupad, Research Scholar Sampling Studies in Statistics, for Ph.D., begun in December, 1945, completed in August, 1949 and accepted by University in March 1950, Published in Proceedings of the International Statistical Conference, Delhi, December, 1951. (In this he has derived the exact sampling distributions of S. S. Wilk's criteria Lc, Lyc, and Lmvc, and also illustrated their applications to certain problems in family budget studies.)

3. K.C. Sreedharan Pillai, Research Officer, (Part-time Research), (*i*) Order Statistics, (*ii*) Quality control for Ph.D., begun in 1945.

(*a*) On the Distribution of mid-range and semi-range in samples from a normal population published in (Annals of Math. Stat., March 1950). (*b*) Some noted on ordered sampled from a normal population (Sankhya Vol. II, Part I, 1951—pp. 23—28). (*c*) On the distribution of an analogue of students 't).

and in (Annals of Math. Stat. Vol. XXII No. 2—1951.)

4. V. J. Chacko, Research Assistant Part-time Research worker, (*i*) Estimation, (*ii*) Design of Experiments for Ph.D., On the Method of 1948 Group Averages Bulletin of the Central Research Institute Vol. I, No. 1, Series B.

An Efficient Method of fitting a line when both variables are subjected to error, in Pro. Ind. Sci. Cong. 1951.

also in Generalised Incomplete Block Designs, Proc. Ind. Sci. Cong. 1951.

Maharaja's College, Ernakulam

Chemistry

1. K. Ganesa Das (Lecturer on deputation), with Dr. P. P. Pillay, Professor, (*i*) The Chief alkaloid of, for Ph.D., begun in 1951, First part is completed (A. Ketoquarternary alkaloid C_1, $H_{23}O_3N$, with the very high melting point of 416 °C has been fully characterised. It is saturated, probably monocyclic, has one Co and one N CH_3OH (quarternary group. Several crystalline derivatives have been obtained and work on the constitution is proceeding.)

   (*ii*) The non-typical constituents of the fixed oil of Calophyllum Inophyllum, begun in 1951, First part is completed. (Three crystalline polycyclic acids, probably of the diterpena series have been isolated and fully characterised, groups analysed and work bading to its constitution is being done.)

2. A. Lakshmi, with Dr. P. P. Pillay, Professor, (*i*) Some Synthetic experiments in the malonic series, (*ii*) The non-typical constituents of the fixed oil of Sarcostigma klenii, for Ph.D.,, begun in 1952.

3. M. Venigopala Menon with Dr. P. P. Pillay, Professor, The constituents of the root bark of Tabernamontan Heyneana, for M.Sc., begun in 1951.

4. T. N. Santhakumari, with Dr. P. P. Pillay, Professor, (*i*) A chemical examination of the latex of Ficus Bengalensis, (*ii*) The orange colouring matter on the stems Bark of Artocarpus Integrifolia. for M.Sc., begun in 1952.

VISVA BHARATI

College of Post-Graduate Research & Teaching

Islamic Culture

1. F. M. Asiri, (*i*) Shah Wali Allah and His Hujjatullahil Balighah, for D.Phil. (Calcutta University), begun in 1950, completed in 1952. (A portion published in Visva Bharati Annals (IV), Part I—(*a*) Life of Shah Wali Allah. (*b*) His Philosophy. (*c*) His Sociological Theories. (*d*) His Mysticism Part II—Analysis of the Persian text of Hujjatullahail Balighah. App.—Shah Wali's disciples and Political Revolution.)

   (*ii*) Studies in Urdu and Persian Literature, begun in 1952, completed in 1952. (A collection of essays on the Beginnings of Urdu Literature, Poetry of Ghalib, Philosophy of Iqbal.)

Islamic History

1. N. B. Roy, (*i*) Studies in Islamic History, begun in 1950, completed in 1951, Published in Visva Bharati Annals, Vol. IV.

   (*a*) Ganesh and Danujmardan. (*b*) Triveni-Pandua. (*c*) A royal mandate of the 14th Cent.—Munshaat-i-Mahra. (*d*) Battle of Buxar.

   (*ii*) Makhzan-i-Afghani—translation and study, begun in 1951, completed in 1953. (A Persian text bearing on the history of the Tughlak period.)

Bengali Literature

1. Panchanan Mondol, (*i*) Puthi Parichaya (in Bengali), begun in 1950, completed in 1951. (The first volume of a descriptive catalogue of the Bengali manuscripts in Visva Bharati. Collections—500 manuscripts.

   (*ii*) Chitipatre Samajchitra (in Begali), begun in 1951, completed in 1952. (A collection of old Bengali letters which throw light on the contemporary society (500 letter critically edited and studied.)

Oriya Literature

1. Chittaranjan Das, (*i*) Achyutananda o Panchasakha dharma (in Oriya), begun in 1950, completed in 1950. (A study of the literature and religion of Orissa in the 16th Century.)

   (*ii*) Orissar Mahimadharma (in Oriya), begun in 1950, completed in 1951. (A study of the Mahimadharma movement of Orissa of the 19th Century.)

   (*iii*) Studies in Medieval Religion and literature of Orissa (in English), begun in 1951, completed in 1951, Published in Visva Bharati Annals, Vol. IV. (*a*) Achyutananda and the Panchsakha of Orissa (*b*) Notes on Iswara Das's Chaitanya Bhagavata. (*c*) Mahima, Dharma. (*d*) The Living Buddhists of Orissa.

Buddhist Philosophy

1. K. Venkataraman, (*i*) Sammitiya in Kaya Sastra (translated from Chinese), begun in 1950, completed in 1951, Published in Visva Bharati Annals Vol. V. (Translation of the lost text from old Chinese version and study of the philosophy of the Sammitiya School of Buddhism.)

   (*ii*) The philosophy of Nagarjuna begun in 1950. (The work being carried on—translation of rare sources preserved in Chinese Buddhist collection completed.)

2. Shanti Bhiskshu Shastri, (*i*) Abhidharmamrta of Ghosaka, begun in 1950, completed in 1951 Published in Visva Bharati, Annals V. (A comprehensive text of Buddhist Psychology of the Samastivade School which was preserved only in Chinese translation now rendered into Sanskrit and critically studied. The author lived in the 1st Century A.D.)

   (*ii*) Jnanaprasthane—Sastra, begun in 1951. (It is the biggest compendium of Samastivade Abhidharma, preserved in Chinese translation—now being rendered back into Sanskrit.)

3. Aiyaswami Sastri, (*i*) Dvadasamukha Sastra of Nagarjuna, begun in 1950, completed in 1951. (A text of Madhyamika Philosophy trans lated from old Chinese translation into Sanskrit.)

   (*ii*) Satyasiddhi Sastri of Hariraman, begun in 1948, completed in 1952. (A text of Santrantika Philosophy rendered back into Sanskrit from an old Chinese translation.)

4. Sujit Kumar Mukherjee, Sardula Karnavadena, begun in 1947, completed in 1950, in course of publication. (A Buddhist Avadave text critically edited from old Manuscripts in the Asiatic Society of Bengal and Societe' Asiatique of Paris and with the help of old Chinese and Tibetan translations.)

Art

1. Haridas Mitra, Contribution to a Bibliography of Indian Art and Aesthetics, begun in 1947, completed in 1950. (A comprehensive bibliography of published and manuscript materials on Idian Silpasastras.)

Zoroastian Studies

1. J. C. Tavadia, Indo-Iranian Studies II, begun in 1950, Published by

Visva Bharati, 1952. (A critical study of the first three gathas of Zorathustra and the four principal prayer in Avastan, Text, translation and commentary.)

Indian Philosophy

1. Sukhamaya Sastri, Tantraloka of Abhinavagupta translated into Bengali with notes and commentaries, begun in 1949, completed in 1952.

Folk-lore

1. Kunjbehari Das, Introduction to a study of Orissa Folk-lore begun in 1950, completed in 1952.

Religion

1. Mrs. Bela Das Gupta, Life and work of Nityananda, begun in 1950, completed in 1952. (A study of Nityananda's contribution to the growth of Bengal vaisnavism.)

Linguistics

1. S. N. Ghosal, A study of Birbhum Colloguiz, Published in Indian Linguistics 1951.

RESEARCH INSTITUTES

INDIAN STATISTICAL INSTITUTE

Statistics

1. D. Basu, Research Fellow of the National Inst. of Sciences and part-time lecturer, (*i*) A note on the Power of the best critical region for increasing sample size, begun in 1950, completed in 1950, Published in Sankhya, Vol. 11. (An enquiry into the conditions under which it is possible to get a consistent test of a simple hypothesis against a simple alternative.

(*ii*) On the limit points of relative frequencies, begun in 1951, completed in 1951, Published in Sankhya, Vol. 11. (Proves that it is impossible to extend Von Mises' defn. of probability by introducing concepts like quasi-limit.)

(*iii*) On the Minimax Approach to problems of estimation, begun in 1951, completed in 1951, Published in Proceedings of the National Inst. of Sciences. (The Waldian approach to the classical problem of estimation has been critically examined and a few intresting problems have been solved.)

(*iv*) On the Independence of Linear functions of Independent Chance Variables, begun in 1951, completed in 1951, Published in Proceedings of the International Statistical Conference, India 1951. (The converse of a few well known results connected with the Normal distribution have been considered. It is proved that these results can be true only in the case of the normal distribution.)

(*v*) On symmetric estimators in point estimation with Convex loss function, (*vi*) On a class of admissible estimators for the Normal Variance, (*vii*) An example of non-existence of the minimum variance estimator. begun in 1951, completed in 1952, Published in Sankhya, Vol. 12, (A series of results in point estimation have been proved here. All admissible estimators are shown to be symmetric fuctions of the observations. It has been demonstrated that minimum variance unbiassed estimator need not exist always.)

(*viii*) On the optimum properties of certain estimators used in Multistage sampling, begun in 1952, completed in 1952, submitted to Sankhya. for publication. (It has been shown that certain estimators commonly in use are actually the best unbiassed estimators within a relatively wide class of estimators.)

2. D. Basu, Research Fellow of the National Inst. of Sciences and part time Lecturer, With R. G. Laha, Teacher, On some characterizations of the Normal Distribution, begun in 1952, completed in 1952, Submited to Sankhya for publication. (If the sample mean be independent of any sample K-statistic then the parent population is proved to be a normal one.)

3. D. Basu, Research Fellow of the National Inst. of Sciences and part time Leturer with S. K. Mitra, Teacher, A note on unbiassed estimation of the Binomial proportion, begun in 1952, completed in 1952, Submitted for publication to the proceedings of the National Institute of Sciences. (A few interesting results connected with the classical problem of estimating the mean of a Binomial population have been obtained.)

4. Jogabrata Roy, Teacher, (*i*) The distriution of blood groups in India, for A. I. S. I., begun in March, 1951, completed in July, 1951. (Estimated blood groups gene-frequencies used to discriminate between regions and communities.)

(*ii*) The distribution of certain likelihood criteria useful in multivariate analysis, begun in July 1951, completed in October, 1951, Published in Proc. Int. Stat. Conf. (India), 1951. (From a general asymptotie expansion of the distribution of the product of independent Beta-variables, the distribution of Wilks' Lmvc and Lvc, and Votaw's Bipolarity Criterion have been obtained in asymptotie form.)

(*iii*) On some tests of significance in samples from Bipolar Normal distributions, begun in January 1951, completed in March 1951: (Submitted for publication in "Sankhya". (The distribution of the bipolar correlation is derived and some tests for its significance are discussed.)

(*iv*) Some results useful in analysis of dispersion, begun in August, 1951, completed in September 1951, Communicated to the Indian Science Congress for publication. (The use of Wilks Criterion in multivariate analysis of variance is discussed.)

5. C. R. Rao, Professor and Head of the division of theoretical research,

(*i*) Statistical inference applied to classificatory Problems, Part I, II, III & IV, begun in 1950, completed in 1952, Published in Sankhya, Vols. 10, 11 and 12. (Deals with a number of problems connected with the specification of an individual as a member of one out of a number groups to which he is likely to belong. In particular distance power tests, efficient selection, genetic differentiation and selection, classification of time series models, etc., are cnsidered.)

(*ii*) A simplified approach to factorial experiments and the punched card technique in the construction and analysis of designs, begun in 1951, completed in 1951, Published in Proc. International Statistical Conference advance off print. (Using on integral representation of the treatment combinations and also of the contrast sets a simple method of constructing confounded factorial designs has been developed. The application of the punched card technique is fully discussed.)

(*iii*) Minimum variance estimation, begun in 1951, completed in 1952, Published in Sankhya Vol. 12. (A number of theorems on minimum variance estimation are given. It is shown that minimum variance estimation is possible only in cases where sufficient statistics exist. The method of using ancillary information in minimum variance estimation is also explained as a possible approach when sufficient statistics do not exist.)

(*iv*) Multivariate analysis and asymptotic distributions, begun in 1950, completed in 1952, Published in Advanced Statistical methods in Biometric Research Chapter 7, 8, John. Wiley & Sons, New York. (Problems of testing for additional information supplied by some characters independently of a basic set are discussed and a method of computing the probabilities of statistics introduced in this connection is developed.)

6. Abraham Matthai, Lecturer, International Statistical Education Centre, Presidency College, Calcutta, (*i*) The planning of sampling investigations when the variables are correlated, begun in 1950, completed in 1952, Published in Sankhya, Vol. 11, 1951. (Maximum likelihood estimates of mean values, when the observations could be put in the form of fragmentary samples have been derived and results applied to optimum designs for sampling on successive occasions. Other applications being investigated.)

(*ii*) Experimental study of time series tests, begun in 1950, completed in 1951, Published in Sankhya, Vol. 11, 1951. (The suitability of Hermann World's large sample tests for Moving Averages, to small samples was experimentally investigated with the help of about 200 model sample correlograms.)

(*iii*) Use of punched card machines for Statistical analysis, begun in 1950, completed in 1951, Published in Sankhya, Vol. 10, 1950, Vol. 11, 1951. (Methods of carrying out certain statistical computations, such as serial correlations, solution of linear equations, etc., with considerable efficiency on punched card (Hollerith) machines have been developed.)

7. A. C. Das, Assistant Professor, (*i*) Theory of Systematic Sampling and problem of Statistical Analysis, for D.Phil., begun in 1948, completed in 1950. (Efficiency of systematic sample, problem of estimation, Topographic variations; Linear Estimation and analysis of Co-variance in a set up ; Partial Canonical Correlations and null-distributions ; Variance-Vestors in appendix.)

(*ii*) Systematic Sampling, III, Published in Science and Culture, Vol. 15 June 1950, pp. 491-92. (Part of (1) dealing with multi-dimensional systematic sampling from cubic cells in the universe. One of the results is that if space-correlation be decreasing with gap and concave upwards along each direction, then random, stratified and systematic sampling procedures are in increasing orders of efficiency. The paper gives the results only.)

(*iii*) On some topographic models, Published in Science and Culture, Vol. 16, Dec. 1950, pp. 259-60, (Results of part of (1) giving sufficient conditions for which $P(u. v) = P(u. 0) \quad P(0, v)$ in two dimensions under different models and also conditions for its consistency.

(*iv*) On the Estimation of parameters in a recursive system, begun in 1950, completed in 1950, Published in Sankhya, Vol. 11, parts 3 & 4 ; pp. 273-—77 (A suggestion for generalising Benzal World's result mainly on the basis of model samples ; associated mathematics will be published elsewhere.)

(*v*) Two-phase sampling and sampling with varying probability, begun in

1951, completed in 1951, Published in Proc. International Statistical Conference, India, 1951. (Deals with problems of estimation.)

(*vi*) Systematic sample, Published in Proc. International Statistical Conference, India, 1951. (Part of (1) dealing with efficiency.)

8. A.K. Gayen, Teacher, (*i*) The distribution of the variance ratio in random samples of any size drawn from non-normal Universes, (*ii*) Significance of difference between the means of two non-normal samples, (*iii*) The frequency distribution of the product moment correlation coefficient in random samples of any size drawn from non-normal Universes for Ph.D. degree in the Cambridge University, England, begun in Mid. 1949, completed in June 1950. Published in Biometrika, Vol. 37, Parts 3 & 4, Dec. 1950. (The mathematical form, of the distribution of t, F and r, in non-normal samples of any size is obtained for parent population specified by the Edgeworth series including terms of fourth and square of third order cumulants. The derived laws hold good for and size of samples if fifth and higher order population cumulans are negligible and for any population provided the samples are fairly large. It is not unlikely that the formulae have quite an extended range of applicability for moderate size of samples. Probability for moderate size of samples. Probability corrections for population 'betas' have been calculated. Where the exact knowledge of the population cumulants is not available, one may sometics safeguard against error by considering corrections for their plausible values.)

(*iv*) A study of recent trend in infantile mortality rates in Calcutta by Longitudinal Survey, begun in December 1950, completed in 1951, Published in Sankhya, Vol. 11, Part II. (A plea is made of the superiority of Longitudinal (historical) data in conducting Infant Mortality surveys over occasional cross-section data (at or about a given point of time) in the determination of the trend in Infant Mortality rates.)

(*v*) On the advantages of Longitudinal survey for the determination of Infantile Mortality rates in India, begun in 1951, completed in 1951, Published in Proc. International Stat. Confs. India, 1951. (The rationale of determining the Infant Mortality rates in compact administrative areas is emphasised. The procedure is illustrated by a model questionnaire form in the text of the paper.)

(*vi*) Studies in the nature of Income Structure in India, begun in 1951, completed in 1951, Published in Proc. International Stat. Confs. India, 1951. (An attempt has been made of the graduation by a generalized form of Pareto Curve of the Income distribution of India in the year 1938-39, one of stable economy. It is found that the Wolf-point for that year was Rs. 1,090 which for per capita estimation works at about Rs. 182 only.)

(*vii*) The effect of non-normality of Quenonille's transformation for the t-statistic, begun in 1951-52, completed in 1952, Published in Sankhya, Vol. 12, (In this paper the effect of non-normality to the Quenonille's transformation for the normalization of the Students t-distribution has been studied by obtaining the cumulants of the transformed variat for non-normal variation.)

BHANDARKAR ORIENTAL INSTITUTE

Sanskrit

1. R. D. Karmarkar, Director, (*i*) Gaudapadas—Karikas. (*ii*) Dramas of Kalidasa. (*iii*) Yoganasistha philosophy. (*iv*) Mahabharata: Asvamedhikaparvan.

2. Miss Sulocana Nachane, Brief Survey of Post Sanikara Advaita Vedanta, for Ph.D., begun in 1950, completed in 1952-53.

3. M. T. Sahasrabudhe, A Survey of Pre-Sanikara Vedanta, for Ph.D., begun in 1950, completed in 1952-53.

4. Mrs. Malini Gokhale, Minor Works of Sainkara Carya, for Ph.D., begun in 1950, completed in 1953.

5. Mrs. Shilavati Oka, History of Gita Literatue, for Ph.D., begun in 1951, likely to be completed in 1953-54.

6. V. P. Mahajan, Ksemendra and his Works, for Ph.D., begun in 1952, lilely to be completed in 1954.

Sanskrit and Ancient Indian Culture

1. S. K. Belvalkar, Director, Critical Edition of the Mahabharata (Santiparvan), Published by B. O. R. Institute.

2. P. K. Gode, (*i*) Ahimsa, the Crest jewel of Indian Religion and Ethics, Published in Mahavir Smiriti Grantha Vol. I, (1950), Agra.

   (*ii*) History of Tin-Coating of Metallic Utensils in India, Published in Prof. C. S. Shrinivasa Chari, Volume Madras, 1950.

   (*iii*) History of Maize in India, Published in Prof. D. V. Potdar, Volume Poona, 1950.

   (*iv*) Antiquity of the Custom of holding Grass in the Month as a sign of Surrender (in the Mahabharata), Published in Chatrika Abhinandan Grantha, Amritsar, 1950.

(*v*) Date of Advaita-Brahmasiddhi of Sadananda Kasmiraka, Published in Annals (B. O. R. Institute, Poona, 1950).

(*vi*) Date of Sridhara-Svamin, the Commentator of the Bhagavatapurana Published in Annals (B. O. R. Institute, Poona, 1950.)

(*vii*) Use of Tambula outside India, A. D. 650—1900, Publishd in Journal of Travancore University Manuscripts Library, 1950.

(*viii*) History of a Nagara Brahmin family of Physicians in Gujarat—A. D. 1275—1475, Published in Dr. Siddheswara Varma Volume Part II, Hoshiarpur, 1950.

(*ix*) Some Puranic Extracts in Apararka about Indian Paleography and education, Published in Poona Orientalist, Volume XIII, Poona.

(*x*) Indian Science of Cosmetics and Perfumery, Published in International Perfumer, England (Surrey), 1951.

(*xi*) Indian Horse-Nomenclature, Published in Varni Abhinandan Grantha Sagar, 1951.

(*xii*) Recipes for Hairdyes in the *Navanitaka* (C. 2nd Cent. A. D.), etc., Published in Bharatiya Vidya, Bombay, 1950.

(*xiii*) Vidyavitasa, a Commentary on the Siddhanta Kammudi, etc., and its Date, Published in Adyar Library Bulletin, 1950.

(*xiv*) The Socalled manuscript of *Advaita Sidhi* Khandana, etc., Published in Sti Maharaval Silver Jubilee, Volume. Dungarpur, 1950.

(*xv*) Believs about the number of ingredients in a *tambula,* Published in Journal of Gauhati University, 1951.

(*xvi*) References, to the plant Asvabata in *Caraka* and *Susanta,* Published in Journal of Baroda Oriental Institute, 1951.

(*xvii*) The Amatory Perspective of the matrimonial Custom of Cutting the Betel-leaf Roll (Vide), Published in Poona Orientalist, Vol. XIV.

(xviii) History of the verse about the Thirteen Qualities of *tambula* Published in Annals (B. O. R. Institute, Poona), 1950.

(xix) Some Words for the Nut-Cracker, Published in *Vak* (Deccan College Research Institute), Poona, 1951.

(xx) Attitude of Hindu Dharmasastra towards the enjoyment of *tambula* Published in Joural of Baroda Oriental Institute, 1952.

BOSE INSTITUTE

Physics

1. M. S. Sinha, (Research Officer), and N. C. Dass, (Junior Research Asstt.), Nuclear Interaction of cosmic rays, for Doctorate, begun in 1951, likely to be completed in 1954-55. (Work to be done in a counter controlled multiplate cloud chamber both at sea level and mountain altitude.)

2. M. S. Sinha, (Research Officer), and N. N. Biswas, (Junior Research Asst.), Capture probability of the messons, for Doctorate, begun in 1952, likely to be completed in 1954-55. (Delayed coincidence arrangement being used to study the mean lives of messons in lead, Al, C and other light elements.)

3. M. S. Sinha, (Research Officer), Construction of a large electron magnet, begun in 1952, likely to be completed in 1953-54. (A large electro magnet with six copper coils and soft iron pole pieces is being constructed for a magnetic field of 10,000 gams at 25 kw.)

4. A. N. Banerjee, (Junior Research Asst.), (*i*) Setting up of a positive rayapparatus, for Doctorate, begun in 1949 and completed. (A radio frequency type of ion source was designed which yields nearly 200 A of ion current of which more than 60 per cent are protons.)

   (*ii*) Construction of a neutron generator, for Doctorate, begun in 1952, likely to be completed in 1954-55. (A monochromatic neutron source will be set up by utilizing D-D reaction.)

   (*iii*) Erection of a High voltage source for 300 kv., for Doctorate, begun in 1953, likely to be completed in 1954-55. (A four stage cockroft Walton voltage multiplication circuit with 75 kv. per stage with high voltage rectifiers and condensers.)

5. T.C. Bhadra (Research Scholar), (*i*) On the generation of high intensity of ultrasonic energy and measurement of the output Power of a Quartz crystal, for Doctorate, begun in 1948, completed in 1952, Ready for publication wll be published soon. (A 500 watts r.f. generator is used to generate high intensity ultrasonic energy. Maximum output of 42.2 watts/cm2 has been obtained for a Quartz crystal at a frequency of 1 mc/s.

(*ii*) On the measurement of the intensity of light diffraction of the pattern produced by ultrasonic waves in pure luquid and liquid mixture and to correlate the datas to find out the molecular structure of liquid, for Doctorrate, begun in 1952, likely to be completed. (A directly reading device for the measurement of the intensity by using vacuum photocell and a D. C. amplifier has been developed.)

(*iii*) Development of Pulse technique to produce pulsed ultrasonic energy, for Doctorate, begun in 1952, likely to be completed by 1953. (A pulsed ultrasonic generator has been built up, Duration of pulse is 20—40 and repetition frequency is 400 c. p. s. This is to study the propagation characteristics such as absorption, velocity and scattering in liquid and solid and also to find out flows in materials.)

Chemistry

1. Dr. Amitabha Sen, Research Fellow, (*i*) Electrophoresis of proteins, begun in July 1952. (Electrophoretic studies of plant proteins and viruses.)

(*ii*) Studies on the Nuclear components of the Genera of Palm. (Isolation and further studies of the nuclei from seeds of the Palm family with the help of chromatography and other techniques.)

2. Anil Chandra Ghose, Research Assistant, Jute Scheme II, I. C. J. C., (*i*) Impregnation of bleached jute yarns with synthetic resins, begun in September 1947. (To standardise the method of bleaching of jute yarns and to gain maximum wet-tensile strength by impregnation with suitable synthetic resins.)

(*ii*) Synthetic preparation of herbicides, begun in September 1947, Published in J. I. C. S., 28, No. 3, 1951. (Eradication and control of water-hyacinth with synthetic heribicides.)

(*iii*) Eradication and control of water-hyacinth with synthetic herbicides.

3. Ram Prasad Chaterjee, Research Assistant, Jute Scheme II, I. C. J. C., (*i*) Preparation of hydrobromide hydrochloride and sulphate of cinchona febrifuge, begun in April 1946, Published in Journal Science and Culture 1952. (Standardising the method of bleaching of jute yarns, and studying the improvement of wet tensile strength after impregnation of the bleached jute yarns with synthetic resin.)

(*ii*) Studied in the synthesis of and B selinine. (Prepared and Isolated various compounds in the synthesis of and B selinine.)

(*iii*) Impregnation of bleached jute yarns with synthetic resins. (Prepared sulphate, hydrobromide and hydrochloride of cinchona febrifuge.)

4. Rabindra K. Basu, Research Scholar, Manpower scheme, Government of India, Biochemical studies of the retting of jute, begun in October 1950, Published in Journal Science and Culture 1952. (Identification of the breakdown products of jute constituents in the course of retting and also by Enzymes from retting.)

5. Chittaranjan Raha, Research scholar (Jr.), Manpowers Scheme Government of India, (*i*) Synthesis of steroid compounds, begun in June, 1951, Published in (*a*) J. I. C. S., 1952, (*b*) Organic synthesis New York, (*c*) J. I. C. S. February, 1953. (To synthesise hormones and steroids.)

(*ii*) Isolation of physicologically active compounds from plants. (To find out sustances present in plants wich may be physiologically active.)

6. Ajoy Kumar Guha, Research Scholar (Jr.), Man Powers Scheme, Government of India, Chemical Investigation of hemicelluloses in jute fibres, begun in June, 1952. (Analyrical studies of the control and mutant jute fibres. Oxidation of the hollocellulose of the jute fibre with nitrogen peroxide and determining the acid value of the oxidised product.)

7. Dr. Debiprosad Burma, Research Assistant, Physico-chemical aspects and application of the technique of column chromatography, paper cromatography and paper ionophoresis in inorganic, organic and biochemical fields, begun in March, 1949, Published in Indian and foreign journals mainly in J. Ind. Chem. Soc. Sc. & Cult. Nature (Lond.), Analyst, Analytical Chemistry. (*i*) Preparation and standardisation of adsorbents for column chromtography (*ii*) Study of the physico-chemical aspects of the technique of paper chromatography. (*a*) graphy in inorganic separation, (*b*) organic speration. (*c*) plant physiological problems such as study of the nitrogen (*iii*) Application of the technique of paper chromato-fixation, etc. (*iv*) Application of the technique of ionophoresis in separation of the nuceic acid constituents. (*v*) Development of the technique of electrochromatography.)

Biochemistry (Enzyme Chemistry)

1. Dr. C. V. Ramakrishnan, Research Scholar, Studies on Lipase and allied Esters systems, begun in January 1953, Published in various Indian and Foreign journals. ((*a*) To grow an active Lipolytic mold in cheap mediums and study and purification of Lipase using different methods like (*i*) Salt pption (*ii*) Gel adsorption (*iii*) low temp solvent pption) etc.

   (*b*) To study the possibility of evaluating a new method for Lipase assay using Berkmann spectrophotometer study of organic acids.

   (*c*) To separate Lipase and different esterases and study their synthetic activities.

   (*d*) To study the Fat synthesis by molds.

Microbiology

1. Dr. P. N. Nandi, Officer-in-Charge, Microbiological Laboratory Research Fellow, Effect of Ultraviolet rays on the production of mutant strains of *Penicilliun notatum* and *Penicillium chrysogenum* cultures, begun in July, 1952, completed in June 1953. (Exposure was given to a spore suspension with U. V. rays of wave length 2537A0 from a distance of 20 cm. for 30 mins. was lethal and the percentage of survival was 5—7 per cent. 28 exposures were given varying the time and the batches of the exposed (treated) suspension of spores were plated out to find mutants amongst survivors. 226 such isolates were obtained and their antibiotic potency was tested against *Staph Aureus*. It seems from the results that in 5 per cent cases there is increase in the potency of antibiotic production.)

2. G. P. Sen, Research Scholar, Isolation and purification of antibiotics from Bacteria and Actinomycetes, begun in April 1951, completed in June 1953. (*i*) (A new anti-fungal substance has been isolated from a bacillus, the properties of which are being studied in detail.) (*ii*) Attempt is being made to purify the crude preparation from a Strepto-myces sp. active against both gram-negative and gram-positive bacteria.

3. S. K. Mukherjee, Research Assistant, Identification of different species of *Streptomyces* Isolated from soil, begun in April, 1951, completed

in July, 1953. (Attempts is being made to isloate different species of *Streptomyces* from soil collected from different parts of the country and to identify them following the technique of growth characteristics on different media as well as their carbon utilisation.)

4. S. P. Sen, Research Scholar, Studies on the biochemical aspects of fixation of nitrogen by means of two dimensional paper chromatograhpy, for D.Phil., begun in September 1951, completed in June, 1952. (Attempt was made to co-relate the fixation of nitrogen with the amino acid content of root nodules from different leguminous plants.)

Botany

(Cytogenetics and Plant breeding)

1. Dr. K. T. Jacob, Head of the Department, Cytogenetics and Plant breeding with reference to crop plants, begun in 1941, Published 3 papers in Scientific journals. (Guiding reserach work in Cytogenetics and plant breeding with special reference to Jute, Cotton, Seasmum and Mustard. Other investigations conducted were (*i*) the lint developmental studies in Cotton (*ii*) hybridization experiments in Yeast (*iii*) studies in the chromosome complexes of Mosquito.)

Plant Breeding

1. A. Adhikary, (*i*) Breeding long stapled Cotton in West Bengal, (*ii*) Jute cultivation under saline conditions, begun in 1944. (Several interspecific and intervarietal crosses in the economic types of Cotton collected from Lyallpur (Punjab) and Coimbatore (Madras) were made. A number of higher yielding and or early strains were isolated from the crosses. The effects of X-rays on several of these strains were studied. In some of the strains, there was considerable increase in the ginning percentage, (up to 22 per cent.) while the increase in lint length was not appreciable. Attempts are being made to cultivate Jute under saline conditions and the results appear to be promising.)

Cytogenetics

1. K. L. Chaudhuri, Effect of X-rays on Sesamum, begun in March, 1950, likely to be completed in March 1954. (Irradiation work on

sesamum is being carried on with a view to obtain mutations with better economic potentialities. So far, strains having higher yield have been obtained in different types; particularly in the south Indian type T. M. V. I., a much higher yield has been obtained and this character is being maintained in the X_2. Some early maturing types - have been isolated from the irradiated populations.)

2. R. K. Basu, Effect of X-rays on Jute, begun in March. 1950, likely to be completed in August 1954. (Dry seeds of four varieties of jute belonging to two main species, *i.e.*, *Corchors capsularis* and *C. olitorius* are exposed to different doses of X-rays and their behaviour studied in the field.)

3. A. Das, Effect of X-rays on Mustard, begun in April 1950, likely to be completed in March 1954. X-irradiation work on Mustard was started in 1950. (The purpose of the experiments is to obtain suitable economic types from the existing strains and few representative types were initially selected. Some higher yielding types have been isolated from the irradiated populations. Studies in pollen sterility and pollen size have been undertaken. Some early maturing types have been isolated from X-rayed populations.

4. S. Bose, Research Scholar, Cytogenetics of Cotton, for D.Phil., begun in November 1952. (A critical study of the somatic chromosomes of five types of Asiatic Cotton belonging to Gossypium arboreum and Gossypium herbaceum is being made with special reference to their nucleolar chromosomes, in order to trace their phylogeny and interrelationships which may help in hybridization work.)

5. Dr. Mrs. S. Batra, Hony. Research Worker, Induced tetraploidy in Musk melons, begun in February 1952, Published one paper in scientific Journal. (The present work is in continuation of the doctorate thesis submitted at Cornell (U. S. A.) on the Cytogenetics of colchicine induced tetraploidy in muskmelons. Throughout last year repeated attempts to grow muskmelons from American and local seeds were foiled due to beetles and bugs. This year, seeds of 8 varieties were germinated in the cold weather and treated with .4 per cent. colchicine emulsion to induce tetraploidy. The objectives is to obtain $2n$ and $4n$ seeds from the same genotype and make a comparative study of their morphological, cytological and yield characteristics.

Weed Control

1. M. G. Srivastava, Weed Control by means of selective herbicide (high land weeds), begun in January 1953.

2. K. George, Weed Control by means of selective herbicide (Low land weeds), begun in January 1953.

Anatomy and Morphology

1. D. N. Chakraverti, Hony. Research Worker, Anatomical studies of Jute fibres, begun in June 1951, Published three papers in scientific Journals. (Anatomical study of jute in relation to growth of fibres in control and X-rayed mutants is being continued from 1951. Very striking difference in the *(a)* number of fibres *(b)* number of patches of fibres and *(c)* dimension of the fibres patches has been noted the mutant showing greater yeild of fibres.)

Anatomy and Cytogenetics

1. Miss M. Dutt, Research Fellow, Cytogenetical and Anatomical studies in Mimosa, Cotton, Coconut etc., for D.Phil., begun in June, 1951, Published 4 papers in scientific Journals. (Banana—Breeding behaviour of some wild diploid, triploid, cultivated triploid and some hybrid triploids and tetraploids were studied. In all cases cytoplasmic inheritance and predominance of maternal characters were apparent.)

Plant Biochemistry

1. Sudhansu Kumar Roy, Fellow, Biochemistry of 'Auxin' action, begun in January 1951, completed in June 1953. (Effect of auxins on different enzymatic processes in plants is being studied. The role of auxins in cell wall formation is also being taken up with special reference to carbohydrate polymerisation.)

2. Satyabrata Sarkar, Research Scholar, *(i)* Biochemical and Physiological studies of excised plant tissues, for D.Phil., of Calcutta University, begun in August 1951, likely to be completed in June, 1954. (Excised plant tissues like root-tips, cambium, embryo, etc., can be maintained, under proper conditions, growing for indefinite

periods. The object of the present investigation is to study the specific nutritional requirements of such tissues, with special reference to the metabolic role of different organic nutrients.)

(*ii*) Effect of auxins on growth of plants (Overall growth, total yield, and vigour of tomato and tobacco plants as affected by extraneous supply of growth hormones in various concentrations has been taken up. Chemical analyses of harvested crops are carried out to determine the changes brought about.)

3. Miss Madhuri Dutt, Research Student, Studies in the Biochemistry of Phosphorus in plants, for D.Phil., of Calcutta University, begun in January 1952, likely to be completed in June, 1955. (Relative concentrations of the biochemically important organic phospho-compounds in plants, at different stages of growth and as affected by various growth regulators are being studied. Role of such compounds in the energy transfer associated with responses to mechanical stimulation in certain plants is also being taken up.)

4. Vidyadhar Nilkanth Gadgil, Research Scholar, Studies in the biochemistry of plant tumours, begun in March 1952, likely to be completed in January 1955. (The role of different agents both of purely chemical and of biological nature, in inducing gall formation in plants is being studied. A detailed biochemical study of the changes obtaining in gall tissue, particularly those relating to various enzymatic systems is being taken up. Further studies of factors antagonist to these causative agents is contemplated for the elucidation of the biochemistry of gall formation.)

Plant Physiology

1. A. T. Guha Thakurta and B. K. Dutt, Research workers, (*i*) Utilization of freshly harvested potato tuber for cultivation (as seed), begun in 1947, completed in 1951, Published in Trans. Bose Res. Inst. Cal. Vol. 18, 1949—51. (Dormant period of Indian potatoes was sufficiently shortened by Treatment with thiocyanates, ethylene—chlorhydrin and CO_2. Immature tubers reacted more readily. A hypothesis has been proposed to account for the effect of different unrelated chemical treatments in reducing dormancy.)

(*ii*) Periodicity in plant growth (with special reference to cinchona), begun in 1948, completed in 1951, Published in Trans. Bose Inst. Cal. Vol. 18, 1949—51. (Growth process indicated periodicity repesented by sequences of sigmoids. In Cinchona apical bud-bursting is correlated with growth periodicity. Longitudinal and diametric expansion occurred mostly at night followed by low rate or contraction during day. Rhythmicity appeared during high rate of growth.)

2. B. K. Dutt, A. Guha Thakurta and Miss Mridula Dutt, Research workers, Autonomous pulsatory movement of the leaflet of Oxalis repens Thun. (Bengalee-Amrool), begun in 1951, completed in 1951, Published in Trans. Bose Res. Inst., Cal. Vol. 18, 1949—51. (Mature leaflet pulsates continuously day and night, completing eight pulses. Young leaflet pulsates during day-time remaining quiescent at night. With administration of 1 per cent., glucose young leaflet continues pulsatory movement at night. Natural pulsation depends upon carbohydrate stored during day.)

3. D. M. Bose (Director), B. K Dutt and A. Guha Thakurta (Research workers) Protein metabolism in excised Desmodium leaflets, begun in 1952 completed in 1952, Published in Science and Culture, Cal. Vol. 17, No. 7, Jan. 1952. (Analysis of activity and behaviour of Desmodium leaflets showed that in excised condition the young ones can synthesize protein, the activity declining with age, and that light energy is essential in the mechanism of protein synthesis.)

4. Mr. B. K. Palit, Senior Research Scholar (*i*) Studies in the Physiology of cinchona plants grown in the planes, (*ii*) Growth in length of the stem of Cinchona plant in relation to the respiration of its roots begun in 1949, completed in 1952, Published 2 papers—in the Transactions of the Bose Research Institute. (Respiration of roots and the growth of the stem were simultaneously observed in a Cinchona Plant grown at the Institute. Periodicity was noticed of growth of stem and respiration of roots. During 90 days, 5 pulses were found in both cases.)

Palaeobotany

1. Atindriya Bose, Research Assistant, Microfossils as an aid to the determination of sedimentary strata with special ref. to the Saline Series of the Panjab Salt Range, for D.Phil., begun in 1947, likely to be completed within 5 years, Letters and notes published in journal Nature (1947, 1952), and in journal Science and Culture

(1950), Transactions of the Bose Research Institute (1950) Geological Magazine, London, (1950) Journal of the Indian Botanical Society, (1950), and also in Proceedings of the Indian Science Congress (1948, 1950—52). (The Phylogeny of vascular plants may be traced from the cambrian period. This inference is derived from extensive microanalysis of rock specimens from the Cambrians or pre-Cambrians of the Panjab Salt Range, Kashmir and the Vindyaans, American specimens are now under investigations.)

2. Radhabenode Majumdar, Research Assistant, (*i*) Microfossils as an aid to the determination of sedimentary strata with speceial ref. to the Saline Series of the Mandi Salt Range, begun in 1951, likely to be completed within 2 years. An abstract is published in proceedings of the Indian Science Congress 1951. (The possibility of the occurrence of vascular flora in Cambrian is suggested by the presence of Spores and cuticles in the limestones.)

(*ii*) Age of the Cherra Sandstone, begun in 1951, likely to be completed within 2 years. An abstract is published in proceedings of the Indian Science Congress 1951. (Angiospemous Pollen grains, cuticles and wood fragments—on maceration of coal samples from Nandang—support the Tertiary age of the Cherra Sandstone.)

(*iii*) Age of the culture bearing beds of Kuliana, Mayurbhanj, begun in 1951, likely to be completed within 2 years. (From the study of fossil woods of dicotyledonous stems attempt is being made to ascertain the age of the culture bearing bed of Kuliana, Mayurbhanj.)

Mycology

The Mycology branch which was so long a section under the composite Botany branch has been separated from the later and made into an independent unit. The result of partition involved considerable administrative and routine duties. The branch never attained its full strength and as a result the research work suffered owing to heavy pressure of routine duties in the already undermanned branch.

The work on the diseases of sal which was started ten years back is nearing completion. Marasmius gordipes Sacc. & Paol., causing thread-blight of sal, has been studied in detail. One of the primary parasites of sal producing symptoms popularly known as 'gauj' has been identified as Fomes caryophylli (Rac.) Bres. This fungus has been studied. Another species of Fomes has been found to produce identical symptoms (gauj) as those caused by F. caryophylli and Trametes incerta. The term 'gauj' has now been pathologically defined to include symptoms produced when sal is attacked by three heart-rot fungi namely Fomes caryophylli, Fomes sp. and Trametes incerta. Studied on 12 secondary parasites of sal have been completed.

Decay tests were conducted on sapwood and heartwood of sal and chir with about 80 species of wood destroying fungi.

Oxidase tests on gallic and tannic acids and gentian violet agar were conducted with about 86 species of wood destroying fungi to determine whether they are white rotters or brown rotters.

Extensive mortality of Casuarina equisetifolia has beeni nvestigated. In plantations in South India, the casuality of trees which grow tall and healthy for the first 3—4 years and die subsequently is due to attack by a parasite Trichosporium vesiculosum. In other areas, the plants become weak and stunted and plantations are a complete failure. Drought and deficient nutrition appear to be the causes of failure of such plantations. Suggestions of raising healthy and vigorous stands include manuring in pits prior to transplanting, deep planting, and frequent watering of seedlings. Stoppage of pruning and lopping branches will prevent T. vesiculosum, an wound parasite, from infecting trees. Spread of this disease in plantations through soil may be checked by trenching diseased trees and other sanitary practices.

Diseases and decays of conifers caused by 15 species of wood-destroying Hymenomycetes have been studied in detail. 5 of these fungi are new records in India.

A species of Mycosphaerella is found in the leaves of diseased Evodia roxburghiana which are dying in an alarming rate. The fungus along with two others have been isolated in culture. The leaves are also heavily infected by nematodes. It now remains to be seen whether the fungi or the nematode are primarily responsible for the dying off of Evodia.

Toxicity of chemicals to wood destroying fungi was determined in the laboratory tests.

Taxonomic studies of the Thelephoraceae have been started.

Lectures in Mycology and Forest Pathology were delivered to students of Indian Forest College and Indian Forest Rangers College.

Routine work involved maintenance of live cultures, herbarium and museum specimens, their exchange, attending to pathological enquiries etc.

Publications: 8 papers had been sent for publication of which 5 are published and 3 are in press.

Forest Entomology

I.—Experimental

1. The investigation on the incidence of attack by borers on newly felled logs of Terminalia belerica, T. tomentosa and Eugenia jambolana, which was started in early 1949, was continued. Tentative conclusion, based on the first year's data, are that storage in the open is preferable to storage under forest shade.

2. Experiments on the water-seasoning of the 3 species of timbers mentioned above were continued and a longer period of immersion (over 5 months) is now being tried.

3. New experiments on the Kiln-seasoning of these species of timber were started by kiln-seasoning at 40^0-5^0C. for 29 days, and the exposing the seasoned planks. So far the controls as well as experimental planks are free from borer attack.

4. The experiments on the use of prophylactic insecticides, started in 1949, were continued and extended, the tests being made for the protection of bamboos, Terminalia belerica and plywood. D. D. T., B. H. C., creosote, fuel oil, borax, pentachlorphenol and coppernaphthanete were used as insecticides and prophylactics. Results so far obtained indicate that both D. D. T. and B. H. C. give good temporary protection against borers.

5. Further observations on the girdled trees in Bihar were continued. The experiment is still under way.

6. A new pilot experiment on the poison-girdling of Bombay malabaricum with sodium silicofluoride, borax, zinc chloride and sodium arsenate was started.

7. Routine tests on the protection of plywood treated in manufacture for protection against insects were carried out.

8. Clum-curing experiments on the protection of bamboos against borers were held in abeyance, pending arrival of chemicals for fresh quantitative tests.

9. Tests for anti-termite protection of timbers by means of chemicals were continued, the chemicals used being D.D.T., paraffin wax-kerosine oil, and some proprietary preparations, *e. g.*, Bosan C., solignam, etc.

10. The effect of heat on the control of the bookworm beetle, Gastrallus indicus, was studied and suitable temperature and duration of treatment arrived at.

II.—Biological and Ecological Work

1. Reports on teak defoliator epidemics were, received from South India were studied.

2. The current epidemics of the sal heartwood borer, deodar, and silver-fir defolitators, phadka grasshopper, etc., occurring in various parts of India were studied and control measures suggested as far as possible.

3. Many other biological items were carried out.

III.—Systematic Work

1. The first few parts of a general Systematic Catalogue of the identified entomological collection in the F. R. I. were prepared and published.

IV.—Miscellaneous

1. A list of errata to Beeson's book on forest insects was published.

2. A comprehensive list of the known and potential hosts of the lac insect is under preparation.

3. A list of the known forest insect pests of India is under preparation. The first two parts are press-ready.

V.—Research Students

Guidance is being given to four research students (three of them registered for the Ph.D., of various universities in India) working in this branch on problems of Forest Entomology.

1. Work in connection with the " Book on Indian timbers " was continued further, specially on the woods of Dipterocarpaceae, Malvaceae and Guttiferae.

2. During this period the work on the " Commercial timbers of West Bengal " has been completed. It is now being published in the form of a hand book, giving information on their identification, properties and uses. The book will of considerable help to the commerce and industry of the State.

3. The studies on the " Relation between height and diameter growth in some trees," Initial parenchyma cells in dicotylednous woods " and " The development and distribution of septate and crystalliferous fibres in Indian trees " were continued. The study of woods of the genus Gmelina has been completed and the results have been sent for publication.

4. Study of ' Red cutch ' (Acacia chundra) as a substitute for Lignum vitae for tail shaft bearings of ships was feerther continued.

5. The investigation to study the best method of tapping sal (Shorea robusta) trees for gum was continued. The time of formation of normal

gum canals, their development and distribution in various parts of the plant were studied.

6. To determine the suitability of various raw materials for the production of cellulose, preliminary work was undertaken. Some woods and bamboo were examined microscopically to understand their cellular composition.

7. Identification of timber formed the most important activity of the Branch. A large number of specimens of driftwoods which came down rivers, after the Great August earthquake in Assam were examined and identified. The total number of specimens identified was 2554.

8. Special investigations dealing with the variety of wood subjects were carried out and 208 specimens were subjected to detailed microscopic examination.

9. Technical advice on the suitability of certain timbers for specific purposes, finding out substitutes for imported timbers and diagnosis of heartwood and sapwood was given. This involved work on 217 cases.

10. A number of officers from various Government departments such as, Army, Railway and Forest Services were given short courses of training in timber identification. Lectures were also given on Wood Anatomy to the students of Forest Colleges and post-graduate studens of East Punjab University.

Wood Seasoning

The air and kiln drying characteristics of several species of wood were investigated. Experiments on the kiln seasoning of veneers were also carried out. The efficiency of the indirect heated thermal circulation furnace kiln was tested after certain alterations to increase the humidity of air had been made. The tests on the girdling of trees were finished on four species of woods. Experiments on the accelerated air seasoning utilizing sun's energy were also carried out.

The study of certain physical properties of wood such as shrinkage and swelling, effect of corrosive chemicals on wood, variation of the electrical resistance of bamboos with moisture content, penetration of heat in timber and moisture gradient in seasoning was in progress.

Service test on jute mill bobbins made of three species of Indian woods were in progress. Service tests on battery separators mag of kail (Pinus excelsa) were started. A simple chemical method of treating deodar pencil slate was developed. Snow shoes made from strips of bamboo were sent out for trial.

Composite Wood

Work on the diffusion of organic molecules through wood, thermal conductivity of wood and fibre boards, was continued.

In tests on the dielectric break down strength Zanthoxylum rhetsa showed a high value while toon and rosewood had a comparatively low value.

Shrinkage losses in the manufacture of plywood were investigated for a few species and R. F. resin glue.

In work on damping in flexure for several species values lower than that reported for foreign timbers were obtained. Work on the strength properties of plywood and composite wood, bamboo boards, etc., was continued.

Chemical examination of wood and bark was continued. Areca nut husk samples had pentosan contents of 27 to 35 per cent.

During thermal decomposition of a few species at 230—300°C. CO_2 and CO were the main gases evolved.

Interesting work on acetylated wood was done. In addition to stability to moisture changes the acetylated wood showed resistance to fungi.

Adhesives were developed from tannins and several new formulations of cashew shell liquid adhesives developed.

Considerable work on the fundamentals of adhesion was done with interesting results. This involved the modification of the wood, modification of the adhesive and rheological study of the adhesives.

The peeling characteristics of several species were studied.

Work on the drying of veneers by Infra red radiation was done with interesting results.

Work on laminated snow shoes, rifle half wroughts, etc., was continued. Bamboo snow shoes and tennis rackets were developed.

Further work was done on bamboo boards. Plastics were developed from bark.

Summary

1. The parent Wood Preservation Branch was separated from the Composite Wood Branch on the 1st May 1951. Dr. A. Purushotham was appointed as Officer-in-Charge of the Branch and Mr. J. N. Pande as the Assistant Wood Preservation Officer.

Research

2. On behalf of the Central Standard Institute, Ministry of Railways a fire-retardant-cum-antiseptic composition was development. At a cost of about Rs. 6,000 provided by the above Institute, 400 chir and 200 laural sleepers will be treated with this composition and laid on the line over-bridges. Those will be the first experiments of this kind in this country and therefore the results will be watched with keen interest. Experiments were also conducted to evaluate the effect of ozone treatment on timber in improving its durability against wood destroying agencies. Leaching tests on ASCU (boric) where the Arsenic pentoxide component of ASCU was replaced by boric acid-both at 25 °C and 40 °C indicate that the fixation of the preservatives in timber is satisfactory.

Large scale tests on the efficacy of penta-chloro-phenol as a preservative for the treatment of sleepers were taken up. 200 chir sleepers treated with a 4 per cent. solution of the above have already been laid on the line. Indian canes were successfully treated with ASCU by the Boucheria process in green condition. Green chir fence posts were conditioned and treated with ASCU for use in the Rajghat area.

To help the housing problem facing the country experiments on the treatment of grasses with ASCU, split bamboos for corrugated roofs and for reinforced concrete or mud wall, bamboo mats for door and window panels, chir and sal (containing sap wood, Bridelia retusa for trusses, mango for purlians, Tetrameles mudiflora. Sideroxylum longepetialatum, chir (sap) (¾" thick planks under 25 lbs. antiseptic pressure), were successfully carried out. Treated materials of the above kinds are undergoing tests under actual service condition.

An untreated specimen of Boswellia serrata was found in sound condition even after 23 years exposure in the 'grave yard.' The wood Anatomist has again confirmed the species as ' Boswellia serrata :'

Cellulose and Paper

I.—Investigations on the production of Newsprint Grade Mechanical Pulps

(1) Mechanical pulps made from Boswellia serrata (salai) and Cryptomeria japonica were unsuitable as such for newsprint as they were coloured and their strength properties were low.

(2) Sterculia campanulata (Papita) gave pulps having strength properties and colour suitable for newsprint.

(3) Preliminary experiments were carried out on the production of mechanical pulps from Sterculia alata (Letkok), Ricinus communis (castor), twisted chir (Pinus longifolia).

(4) Preliminary experiments were carried out to lighten the colour of mechanical pulp from Boswellia serrata by bleaching with bleaching powder and sodium peroxide.

II.—Investigations on the Production of semi-chemical Pulps

Wrapping papers of satisfactory strength properties were made by the neutral sulphite semi-chemical process from :—

Boswellia serrata, Lannea grandis (jhingan) and Garuga pinata (kharpat).

III.—Investigations on the Production of Chemical Pulps.

1. The soda process was found more suitable than the monosulphite process for the pulping of illuk grass (Imperata arundinacea).

2. Easy bleaching chemical pulps from following raw materials were prepared :—

Helicteres isora (maror phal), Corchorus capsularis (jute sticks) Vetevaria zizaniodes (panni grass) Stercilia campanulata (papita) Cryptomeria japonica Broussonetia papyrifera, Sterculia alata, Twisted Chir (Pinus longifolia) Arundo donax (Narkul grass) Castor stems (Ricinus communis), Broussonetia papyrifira and Lannea gradis.

3. Easy bleaching pulps were prepared from Dendrocalamus strictus (bamboo) by the nitric acid process.

IV.—Investigations on the production of straw boards, pressed boards and insulation boards

1. Straw boards of satisfactory strength properties were prepared from :—

Ulla grass (Themeda arundinacea), rice straw, bagasse, sirum and patel grass and panni grass (Vetevaria zizanioides).

2. Investigations on the production of strawboards from spent-tan bark were started.

3. A sample of fine wood shavings consisting of a mixture of several broad-leaved species supplied by a Punjab wood working firm was found suitable for pressed boards.

4. Work on the preparation of pressed and insulation boards from :—

Ulla-grass (Themeda arundinacea) and Boswellia serrata was commenced.

V.—Other Investigations

1. Work on the preparation of multiwall paper bag from the indigenously produced craft paper was started.

2. Work on the comparison of china clay and talc for retentivity and opacity in papers was continued.

3. Bamboo pulps with different contents of lignin were prepared in connection with the investigation of the influence of lignin contents of chemical pulps on their keeping properties.

4. Work on the preparation of lignin from Dendrocalamus strictus by different methods was started.

5. Urea formaldehyde and melamine formaldehyde resins from Messrs. Imperial Chemical Industries Ltd. were tested for improving wet strength properties of papers and the latter found suitable.

6. The relative weight factor of Boswellia serrata sulphate pulp was found to be 0.476.

7. Comprehensive work on the delignification of ulla grass (Themeda arundinacea) was undertaken.

VI.—Chemical Analysis of raw Materials

The chemical analysis of the following raw material was completed:—

(*a*) Lannea grandis (*b*) Boswellia serrata (*c*) Vetevaria zizaniodes (*d*) Arundo donax (*e*) Helicteres isora (*f*) Abies pindrow (fir) from chakrata. (*g*) Ricinus communis (castor steams) annual as well as perennial variety.

VII.—Publications

Three papers were published, three were sent for publication and eight were ready for publication.

Summary

1. Aquileria agallocha Roxb. From a number of large-scale experiments carried out, the methcd of extraction of agr oil from the wood of Aquilaria agallocha has been standardised. A detailed note on the economics and technique of the distillation has been prepared. Along with pure samples of the agar oil, two qualities of agar attars have also been prepared.

It has also been shown that the development of agar oil in the felled trees is not due to the action of any hydrolytic agents on the wood.

2. Anisochilus carnosus Wall. The leaves of this plant give 0.44 to 0.90 per cent of an essential oil resembling thymol in its odour.

3. Saussurea lappa C. B. Clarke. It has been shown that the Indian samples are superior to the best French samples and that they possess a greater fixative power.

4. Juniper berries: Some of the berries, particularly those of Churah

and Upper Bashahr Forest Divisions, give fairly good yields of the essential oil (1.68 and 1.80 per cent. respectively), though the figures are still far below the average of 3 per cent obtained from the Baluchistan and Kashmir barries.

5. Gardenia gummiferra Linn. The resin acids obtained from the resin of this tree have been studied in some detail.

6. Sterculia urens Roxb. The fatty acids obtained from the seed-kernel oil have been separated into different fractions and studied. Myristic and palmitic acids have been identified as components of some of the fractions. The liquid acids consists mostly of oleic acid (96.4 per cent.) and linoleic acid (3.6 per cent.).

The residue from the kernels,left after extraction of the fatty oil,contains 42.30 per cent. of carbohydrates and 32.22 per cent. of albuminoids and hence seems to offer a source of food, since the kernels are edible. The nutritional properties of this material are under investigation at the All Indian Institute of Hygiene and Public Health, Calcutta.

7. Cornus capitata Linn. The seeds of the fruit of this Himalayan tree contain about 9 per cent. of a fatty oil which posses certain interesting jelly-forming properties.

8. Tamarind Kernel Powder (T. K. P.) :—The natural pale yellow colour of the powder can be improved to some extent by admixture with certain dyes, particularly bazar blue to an extent of 0.25 per cent.

Regarding lumpiness in the powder, it has been shown to be due to the presence of reducing sugars. It is, however, no advantage to remove the reducing sugars, since they assist an easy dispersion of the powder in water during size formation. In order to avoid lump-formation, it has been suggested that the powder should be packed in multi-walled paper bags so that access to moisture is cut off.

T. K. P., when admixed with soap base, prevents sweating of soaps ; but the lathering and detergent properties of the soap have been reported to be adversely affected to some extent.

9. Dioscorea daemona Roxb. The tubers of this plant contain about 70 per cent. of starch; but they contain a small amount of a poisonous alkaloid

also. Methods of destroying this alkaloid have been worked out so that the starch becomes edible.

10. Urtica parviflora Roxb, Clerodendron infortunatum Gaertn, and Spinacia oleraceae Linn. :—The leaves of these plants have been examined for their chlorophyll content. The first two contain 3.8 per cent. and the third 5.4 per cent. of the pigment. The pigment has been recommended for the coloration of vanaspati, in order to prevent the adulteration of pure ghee with the hydrogenated fat Methods of detecting chlorophyllised vanaspati as adulterant have been indicated.

11. Eclipta alba Hassk.—This common weed is said to contain a dye useful for colouring hair oils. On extraction with alcohol it yields a crystalline material and a dark resin. The latter imparts a deep green colour to oils.

12. Cedrus deodara Loudon.—The wood contains about 5 per cent of an essential oil which could go as a substitute for the foreign cedarwood oil.

13. Linaloe leaf and Linaloe berry Oils—The two oils differ from each other in their physical constants and chemical composition.

14. Homalomena rubescens Kunth.—The roots (Gundhi roots) of this plant, which are used for perfuming snuff and other tobacco products, contain 1.26 per cent. of a sweet-smelling essential oil.

15. Artemisias.—A simple and accurate method of assay of the drug has been developed.

16. Analysis of Sugars and Sugar Acids.—Applying the technique of paper-chromatography, a method has been developed for the identification of the common natural sugars and uronic acids.

17. Mallotus philippinensis Muel. Arg.—A method of extraction with linseed oil of the fast-drying kamala oil present in the seed kernels has been worked out. The processed extract is more rapid-drying and has better covering power and gloss than boiled linseed oil.

The kamala oil is also useful for converting vegetable oils into products resembling petrolatum jelly.

18. Research Student—A student of the East Punjab University has been admitted into the Branch as a research student.

19. Draft Specifications—Several draft specifications have been prepared for the Indian Standards Institution.

20. Monographs.—A monograph dealing with the drugs of chakrata, Dehra Dun, Saharanpur and the neighbouring Forest Divisions is under preparation.

21. Publications.—Six research articles have been published in various scientific journals.

Commercial minor forest products.—Field and laboratory investigation of Lahoul (Kulu Forest. Division in the Punjab) Artemisia brevifolia Wall, shows that there are at least 5 forms of the plant growing there. One of these yields a good amount of santonin (1.0 to 2.7 per cent.). The best period of collection is from end of June to end of July. Massageto's method of assay for the estimation of santonin has been modified and this given satisfactory results.

2. Samples of Ephedra from Himachal Pradesh, Punjab and Uttar Pradesh were analysed, but only some from Lahoul (Kulu Forest Division in the Punjab) have shown a high percentage of ephedrine. (Upto 2.2 per cent. of total alkaloids out of which 1.78 per cent. is ephedrine.)

3. Economic survey of avaram bark, tamarind seed, bhilawa nut, rosha grass and karaya gum were started in Bombay, Mysore, Madras and Hyderabad States and valuable information collected.

4. Ocimum kilimandscharicum Guerke.—About 2½ acres of the plantations were maintained for seed supply, and 28 lbs. of seeds were collected.

The results of statistical analysis of the experiments on the yield of leaves per acre under different manurial treatments show the superiority of sulphate of ammonia over farmyard manure at the rate of 45 lbs. of nitrogen per acre.

There was continued demand for ocimum seed for trial cultivation in different parts of India. Technical help was given to a private party for raising a large-scale plantation.

5. Cultivation of economic plants.—Cultural experiments were conducted on ten plants of economic importance. The more important among those were Rauwolfia serpentina Benth. ex. Kurz, Cymbopogon nardus

Rendle, Hibiscus abelmoschus Linn., Chenopedium ambrosioides Linn., var anthelminticum Gray, Eucalyptus spp., and Rhamnus purshiana DC.

6. Monographs.—The first volume of the monograph on "Poisonous Plants of India" has been published, and work in connection with the 2nd volume has made good progress.

Series 14 of the monograph on "Aromatic Plants of India" has been published.

The monograph on "Tanning Materials of India and Burma" has been completed and will be out shortly.

1951—52

Silviculture

General :—The VIII Silvicultural Conference was held during the year, which kept the officers and staff of the Silviculture. Branch very busy. The officers contributed 28 pepers for the Conference. Besides editing the research reports received from them, the States were, as usual, given advice about the conduct of research. The Central Silviculturist continued to edit the Indian Forester.

The Research Garden and Demonstration Area :

In the experimental section the following important investigations were either started or continued from previous year :—

(1) Observations on seed production of Cinnamemum camphora Nees and Ebern.

(2) Seed weighment of 76 species.

(3) Collection of phenological data on trees,

(4) Inheritance of figure in Terminalia crenulata, resin yielding capacity of Pinus longifolia, and growth form of 8 seed origins of the same species.

(5) Results of delaying the date of stump planting of sissoo and toon.

(6) Results of delaying the transplanting date of Merus alba, toon, Paper mulberry,

(7) Determining the most suitable diameter size of stumps of 5 tree species.

(8) Development of root sections of 4 tree species.

(9) Comparison of relative efficiency of sowing *vs.* transplanting *vs.* stump planting of 4 tree species.

(10) Relative viability of three seed sizes of Shorea robusta.

(11) Best date of seed owing during hot weather of two tree species.

(12) Experiments to study the effect of "debudding" on growth form and production of knot-free timber of Pinus longifolia. It was found that debudding, either repeated or annual, produced no significant difference in height growth.

The planting activity of the Branch consisted in stocking portions of the khud area with Dendroclamaus strictus, planting Pinus halepensis and Acacia cyanophylla behind Bungalow No. 9, and Ricinus cunmunis elsewhere. Thinning was done by the Assistant Silviculturist of the chir crop in 4 compartments, teak crop in 6 compartments and Morus alba and Acacia catechu crops.

Desk Work of the Experimental Section.

The Assistant Siviculturist completed the monograph on Dalbergia sissoo and took up the work on teak. He also edited the arrear issues of the Indian Forester.

Statistical Section.—In the Statistical section, the following were completed :—(1) 403 sample plot files, (2) height analysis figures of teak trees of Madhya Pradesh, (3) six E. P. files of Nellore Division. (4) Figures of Statistical Analyiss of 4 E. P. files of Nellore division. The revision of the yield tables of teak and chir pine were started.

Soil Section.—The chemical analysis of the Post plantation teak soils undertaken and it was found that the chemical nature of the soil does not change under the changed canopy conditions. The condition of Casuarina soils from Madras where trees of the species were dying was investigated and it was found that a soil when clay or leam is in the sub-soil and sandy soil is on the top is more advantageous to Casuarina than the others. The soils of the Rajputana desert were examined and it was found that (1) salt content is not high in desert sands, (2) sodium clay is formed in desert sands which retards through percolation of water and thus helps retention of moisture in the upper soil layers.

Ecology Section.—Folliar anaysis of 30 tree species occuring in coniferous forests was done and it was found that on the whole conifer leaves have low ash and calcium but high C/N ration. Oaks leaves have similar composition. Other broad leave species, on the other hand, have high ash and Ca but low C/N. The Ecology of some eastern oak forests and Cryptomeria plantations was studied, of the Darjeeling area of West Bengal, and it was found that pH of soils in this area is low for the Himalayas. A study of the some sal areas in Madhya Pradesh showed that in I and II quality sal, where natural regeneration is good, the soil has low pH, low Ca content and low organic matter, but there is a regeneration pH, Ca content and organic matter are all high. Good quality sal is found on light rocks like schists and sand-stones. Sal occurs in rocks with pH below 7 but where pH is higher miscellaneous species appear and sal disappears. Teak, on the other hand, occurs on rocks and soils with high pH and high amounts of exchangeable calcium. The results indicate that probably sal is a calcifuge and teak is calcicole.

Botany

1. Besides the maintenance of the existing collections, 2,085 specimens were incorporated into the herbarium during the year. The more important sources specimens were.—Dr. N. L. Bor's collections from Lahul and Assam ; specimens of Bonati Herbarium, China presented by Dr. Pennell ; Mr. Carles Junge's from Chile, Mr. G. E. Edanq's from Philippines ; Dr. F. L. Benett Canyan's from S. Dakota ; Mr. P. Khant's Burma collections ; Dr. H. F. Mooney's from Orissa ; collections from New South Wales Botanic Garden, Sydney ; Siamess specimens from the Arnold Arboretum ; and collections from Bashahr and the foot-hills of Panch Chuli range in the Himalayas.

2. The following were among the chief visitors who consulted our herbarium.—Mr. Harbhajan Singh of I.A.R.I., New Delhi; Dr. P.C. Joshi of National Chemical Laboratory, Poona; Mr. D. Gupta of Dunger College, Bikaner ; and Mr. R. C. Sawhney of Council of Scienific and Industrial Research, New Delhi.

3. About 880 specimens were sent in exchange to.—The Curator,

New York Botanic Garden; Director, National Museum, Manila; Curator of the herbarium, Botanic Gardens, Singapore; the California Academy of Sciences ; and Mr. C. Junge of Chile. Approximately 500 specimens were received in exchange.

4. 1,697 specimens received from various institutions and research workers were identified and reported on .

5. Revision of nomenclature of a number of species of plants was done in connection with a publication on the host-plants of the lac insect and for the Indian Standards Institution.

6. Work on genetical improvement of forest species and associated techniques was started by this branch for the first time.

The items attempted were :—

(*a*) Seedlings were raised from self-pollinated seeds of Shorea robusta and Michelia champaca.

(*b*) Ocimum kilimandscharicum was successfully polyploidized with colchicine.

(*c*) Teak scions were successfully grafted to established clones for subsequent breeding work.

(*d*) Several grafting methods were attempted with Pinus longifolia and Pinus caribaea.

7. 70 new books or periodicals were added to the library.

8. 1,274 seed packets were supplied to indentors in India and abroad. In addition, certain scions for grafting and pollen for hybridization, were flown to Finland and Canada.

About 1,200 plants were raised in the nursery and supplied to various State and public institutions and private individuals.

9. Botanical Garden and Arbroetum were maintained as usual.

10. Information on various items was supplied to different workers, in Indian and outside,

11. Training Scheme in Systematic Botany was brought to a close on 31st May, 1951.

12. 12 coloured and 15 black and white plates were added to the collection.

13. Mr. K. C. Sahni accompanied the California Academy Panch Chuli Expedition for 5 weeks and collected about 400 botanical specimens from up to 16,000 ft. Mr. Sahni again left for the Great Nicobar Expedition on 13th February 1952.

14. Courses of lectures on Systematic Botany and two lectures on Genetics were delivered to the students of the Indian Forest College.

Mycology

Research and Experimental Work:

During the year under report investigations were conducted on diseases of sal due to Fomes caryophylli, Fomes sp., and Trametes incerta. Biology, pathology and cultural studies of 24 other secondary parasites of sal were taken up.

The work on the diseases and decay of conifers was continued, and the data compiled for publication. The causes of high incidence of Fomes annosus in young deodar plantations and of Armillaria mellea in the Himalayan Oaks were studied and controls suggested.

Studies and experiments were conducted in the field to find out if agar formation in Aquillaria agalocha trees could be induced and accelerate by inoculation of healthy trees with the fungi isolated from diseased trees where alone agar formation takes place.

Taxonomic and decay studies of 50 species of Indian Thelephoreceae were completed.

To determine the efficacy of fungi in destroying wood decay tests were carried out with about 100 fungi on heartwood and sapwood of chir and sal. Besides about 100 fungi were classified into white rotters (lignin destroyers) or brown rotters (cellulose destroyers) by conducting oxidase tests on malt agar medium containing gallic acid tannin acid, gentian violet media. Tests were conducted to determine the efficacy of certain chemicals as wood preservatives.

Parasitic Tree Disease :

Inoculations of potted plants of Evodia roxburghiana with Mycosphaerella sp., and Albizzia procera with Cephalesporium sp. were carried out. The results are inconclusive.

A study of disease of Gmelinadarberea in Assam due to a species of Poria has been undertaken.

Routine: Normal routine work like maintenance of stock cultures, addition of more fungus specimens to herbarium and museum, exchange of cultures, photographs, publications, etc., with various laboratories in India and abroad. Examination of seeds for the presence of injurious fungi before sending them abroad as also teaching and conducting the examination in India Forest College and Indian Forest Ranger College were carried out as usual.

Publications :

Seven papers have been published during the period under review.

Entomology

(a) Experimental Research :

1. The investigation on the incidence of attack by borers of newly felled logs of Terminalia belerica, Terminalia tomentosa and Eugenia jambelana is new in the third year. The data gathered are under study.

2. Experiments on water-seasoning of logs for long periods (6—12 months) were carried out. The sawn planks have been exposed and are under observation as regards insect attack.

3. Experiments on kiln-seasoning of timber to confer anti-borer immunity are being continued. So far, no particular immunity has been conferred.

4. Last year's experiments on the use of prophylactic insecticides were greatly extended, and a considerable number of new insecticides experimented with.

5. Poison-girdling experiments on Bombax malabaricum, started last year, were continued, and new devises evolved for introducing the poisons. The poisoned trees, after being felled and sawn into planks, are under observation for insect attack. These experiments were also extended to the bamboo (Dendrocalamus strictus).

6. The clump-curing experiments on bamboos were extended to study the effect of retention of foliage on starch, water-depletion, etc., and finally, on anti-borer immunity. Culms with foliage were also kept partly immersed in poisionous solutions to find out the degree of absorption of the poisons and the subsequent anti-borer immunity.

(b) Biological and Ecological Work:

1. Reports of the teak of defoliators from S. India continue to be recorded and analysed. A new proforma for these reports was devised and circulated to the forest departments concerned.

2. The epidemics of the sal-heartwood borer (1948—51) and deodar and silver-fir defoliators in Himachal Pradesh were kept under observation.

3. A study was made of the distribution, etc., of the lantan bug Teleonamia scrupulosa Stal, a newly established insect in India.

4. The egg-laying habits of the bamboo-borer, Extigmena chinensis were studied.

5. The life-history of the longicont borer, Aphrodisium cantori, was studied in connection with a die-back disease of rohini (Mallotus philippinensis) in the Barkot Range near Dehra Dun.

(c) Systematic Work:

1. Parts 9—21 of the Systematic Catalogue of the Main Identified Entomological Collection at the Forest Research Institute was prepared and sent to the press.

2. The study of immature stages and routine identification continues.

Miscellaneous:

1. The list of lac-hosts, mentioned last year, was completed.

2. The compilation of list of forest pests is continuing.

Research Institute:

Guidance is being given to four research students (3 of them registered for the Ph.D., of various Universities), who are working under the Forest Entomologist.

Wood Anatomy

1. Considerable progress was made in connection with the work on a " Book on Indian timbers," Preliminary writing-up of the families Diptero-carpacene and Malvaceae was taken up.

2. The studies on the " Relation between height and diameter growth in some trees." " Initial paenchyma cells in dicotylendenous woods " and " The development and distribution of septate and crystalliferos fibres in Indian trees" were continued.

3. Study of " Red cutch " (Acacia chundra) as a substitute for propellor shaft bearings of ships was further continued.

4. Anatomical studies of cellulosic raw material was further continued.

5. A preliminary study of anatomical structure of two bamboos namely, Dendrocalamus strictus and Bambusa arundinaceae has been taken up.

6. Identification of timbers as usual took up considerable time of the Branch. Among the thousand samples received for identification, 22 timbers from South East Arabia and one fossil wood specimen from a river-bed in Garbata, Midnapur district, West Bengal were of particular interest.

7. Technical advice was given to interested parties on various aspects timber utilization, such as suitability of certain indigenous timbers for specific purposes, substitutes for imported timbers, feasibility of estimating age from growth rings, sources of supply and availability of timbers. In all 197 enquiries were disposed off.

8. A number of officers from various Government departments such as Defence, Railway and Engineering services were given short courses of training in timber identification. Lectures in wood anatomy were delivered as usual to students of the Forest Colleges. Post graduate training in advanced Wood Technology, was also given to some research workers.

Timber Mechanics

Strength tests were done under project I (full scale tests), *viz.*, testing of small clear specimens and project I/P (Preliminary small scale tests) on 14 consignments of timbers in the green condition, 7 in the air dry condition and 6 in the kiln dry condition to determine their fundamental strength properties. These include tests on (Morus species) mulberry from plantations in U. P., Andamans and Assam, in order to determine the quality of timber produced from these plantations. It was found that the timber compared favourably with that from the West Punjab plantations which was formerly the main source of supply for the sports goods industry.

Twenty tea chests of Holoptelea integrifolia, (kanju), were tested according to I. S. I. specification, for M/S. Plywood Products, Ltd., Sitapur Comparative tests on samples of teak from Burma, Siam and Malabar sent by the Southern Railway, Madras were made and report on the qualities of the three teaks was submitted. Comparative test on the quaiity of Dalbergia sissoides and Dalbergia sisso were made for the Silviculturist Madras.

A considerable amount of miscellaneous co-operative testing of test samples sent by the Composite Wood, Cellulose and Paper, Wood Seasoning and Wood Preservation Branches of the Forest Research Institutes was also made.

In all about 10,000 mechanical tests and about 27,000 physical determinations including moisture and specific gravity determinations, weighment and measurement of air drying and shrinkage sticks were made during the year. Over 65 technical notes, reports and letters were issued on various subjects such as tool handles, packing cases, teachests, flooring, substitutes for foreign timbers, foot rules, timber for ammunition boxes reviews of specifications, etc. Lectures were given to the students of the Indian Forest College on Timber Testing and to the students of the First International Grading School started by the F. A. O. at Singapore on the theory and practice of teak grading.

Service

The Service Branch consists of Wood Workshops and Iron and Electric Workshops.

Wood Workshop Section :

Over 15,202 tests specimens and hand specimens were supplied to various branches of the Institute and 6,045 cft. of timber logs of various species converted for different branches. About 895 jobs were completed in the Wood Workshop. Test on working qualities of different species of timbers were carried out. In addition, experiments on the theory of planning, survey of present method of testing toughness, correlation between maximum height of drop in Hatt-Turner and Izad test were made and variation of stiffness with increasing drops in Hatt-Turner machine were investigated and equations developed between toughness and other dynamic and static properties.

Testing of new laboratory scale electric poles on laboratory size model equipment and two reports on this have been written up.

Engineering Section:

This Section has been very busy with the erection work for Composite Wood Branch (2 Centrifuges, Vaccuum Dryer High Pressure Press, Gas Connections, 600 Ben ton Press Electric Control system, Grinder, End Edge Runner Grinding machine), Cellulose and Paper Branch (2 Disintegrator, Gas plant), Timber Mechanics Branch (Converter, and Hydralulic Timber Testing Machines), Wood Seasoning Branch, (Bending machine, and kiln), Wood Preservation Branch (Gas Connection, Trolley Line to the steaming pit, Special pit and 2500 lbs. pressure treating cylinder), Service Branch (Cross Cut Trenching Saw, Log Cross Cutting Machine, Vertical Log Band Mill, 2 Circular Saws, Saw Sharpening Machine, in Saw Mill, Auto Nailer, Sliding Machine, Horizontal Boring and Mortising Machine, Drilling Machine, Six cutter Moulding Machine. Veneer Dryer, Planner. Frot Sawing Machine, Steam Pipe Line for the log pond in Wood Workshop, and Cupola, Blower, Foundry (in M. E. Section) and overhauling of defibrator machine, sheet making press, and old Band Saw Machine.

In addition, over 607 important jobs were completed and repairs done to the 3 Government trucks, lawn mowers, Fire fighting equipments, Gas plant, etc., etc.

Wood Seasoning

Several commercially important species of woods were tested for their kiln drying behaviour. Detailed study of the drying behaviour of certain refractory hardwoods was started. This included a study of moisture gradients and drying potential.

The air seasoning tests utilizing sun's energy were continued. The air drying behaviour of certain species of woods was investigated under ordinary air drying conditions, including seasoning of B. G. sleeper of Shorea robusta (sal).

The study of certain phyiscal properties of timber and bamboo was continued, This included shrinkage, swelling and moisture equilibrium of wood and bamboo, effect of corresive chemicals on timber and electrical resistance of bamboo.

Service tests on jute mill bobbins with 3-ply solid ends have shown that the bobbins of this type are "very good and extremely suitable for the purpose." The product represents an important contribution of the old Wood Working and Timber Mechanics Branch and the Wood Seasoning Branch to the use of built-up wood.

Cedrus deodara (deodar) treated according to two methods developed by the Forest Research Institute has been accepted for pencil slates by the pencil makers.

The tests on battery spearators made of Pinus excelsa (kail) have shown that the timber is suitable for replacement purposes only. It is not a first class separator wood.

The systematic tests on bending of wood have shown that in addition to mulberry, oak and elm are good for bending and that rosewood is also promising.

Nine timbers were tested for slate frames. Gmelina arborea (gamari), Trewia nudiflora (gutle), and Dysoxylum malabaricum (white cedar) have been found suitable for superior quality slate frames and Artocarpus integrifolia (kathal), Terminalia belerica (bahera), and Mangifera indica) (mango) for ordinary quality frames.

Composite Wood

Physical and physico chemical investigations:

The diffusion of methyl, ethyl, amyl, butyl alcohols, glycerel and phenol and some fatty acids through 4 species of water saturated wood was studied. The thermal conductivity of rockwood and tapioca stem boards was determined and the thermal plasticisation of several species in the H. F. field studied. The influence of psychrometric conditions on the physical properties of laminated wood from six species was also studied with interesting results.

Chemistry of bark, etc., and modified wood:

Various samples of bark, tapioca, stem, etc., were examined with particular reference to their suitability for board manufacture and the preparation and properties of "native lignin" studied with interesting results. Preliminary work on phosphated wood was done.

Adhesives:

Work on the suitability of proteins for adhesives was done. Work on sunn hemp and Albizzi lucida seed proteins was completed. A water resistant adhesive was also developed from coconut shells. Work on the adhesive from cashew nut shell liquid was continued. Considerable work was done on the rheology of adhesives and fundamentals of adhesion.

Manufacturing Technique:

Several species were peeled and tested for their suitability for plywood.

The work on the infra red tunnel veneer dryer was published and an I. R. dryer for match sticks developed.

Building boards, etc.:

Building boards were developed from tapioca stem, Hoop pine bark coconut shells, etc., with good properties.

A dry process using no resin binders for dust boards was developed and work on bamboo boards continued.

Wood Reservation

Dr. Purushotham held charge of the Branch and Shri J. N. Pande of the post of Assistant Wood Preservation Officer. Dr. Purushotham was elected a member of the American Engineering Association and American Wood Preservers' Association.

A cheap fire-retardant paint which has given good results was evolved for mine-props and timbers in cinema halls. A study of the effect of various types of wood preservatives and also of the increase in dimensions of the cross-section of test specimens on the fire-resistance of timbers was made.

Experiments were conducted on the fire-proofing of canvas on behalf of Defence Departments. Palmyra leaves and grasses were also satisfactorily treated against fire and rot.

The preservative copper chrome boric was tested on wood against leaching and toxicity to fungus and insects.

Experiments were carried out on the prophylactic treatments of timbers and bamboos for protection against fungi and insects with successful results.

Toxicity tests against fungus and also against termites in termite mounds were carried out on a number of water soluble toxictions with or without dichromate as a fixing agent.

Large scale tests on 400 B. G. sleepers of chir and 166 B. G. sleepers of laural treated with fire proofing cum antiseptic composition, were carried out. The chemical used for this purpose were supplied by the Central Standards Office, Ministry of Railways. Pentachlorophenol was used in the treatment of another batch of 100 sleepers of Chilanni (Schima wallichii) and laurel. Sleepers so treated were laid along side with creosote-fuel oil treated sleepers for service tests.

Experiments were also carried out on the treatment of green poles and canes by the Boucherie and Osmose processes.

For the preservation of packing case timber, experiments were conducted on a low pressure treatment with inorganic preservatives for which purpose a special plant was designed.

Analysis of Bruguiera poles treated with creosote-fuel oil (50 :50) mixture by the hot and cold process was carried out for the residual content of the preservatives. These poles have given a satisfactory service of over 10 years in the test yard here. Therefore this treatment was recommended for large scale commercial treatment of Bruguiera poles in the Andamans, and for this purpose a plant is being installed there.

Advice was given to various parties regarding the installation of timber treating plants and also on the fire-proofing of timber, grasses, textiles, etc. A draft specification on the Code of Practice for Wood Preservation was prepared for the Indian Standard Institution.

A draft Constitution for the inauguration of the Timber Dryers' and Preservers' Association in India was drawn up and circulated to various interested parties and Heads of Departments.

Cellulose and Paper

1. The species that were tested for their suitability for newsprint grade mechanical pulps included Boswellia serrata (salai), Tetraneles nudiflora (bhelu), Acacia mollissima (wattle), Hicinus communis(castor) of perennial variety, and Albizzia stipulata (siran). The work on salai wood was terminated. Further work will be carried out on other species mentioned above.

2. Investigations on the production of semichemical pulp from wattle wood (Acacia mollissima and Acacia decurrens) were carried out with encouraging results.

3. Chemical pulps were prepared from the following:—
   1. Broussonetia papyrifera (paper mulberry). 2. Acacia mollissima (wattle). 3. Phragmites karka (nal). 4. Heteropogen contortus (kusal grass). 5. Tetrameles nudiflora (bhelu). 6 Helicteres isora (maror phal). 7. Boswellia serrata (salai). 8. Acacia decurrens (wattle). 9 Linseed stalk.

4. Work on the production of strawboard from Panni grass (Vetiveria zizanioides) was completed. Sal bark (Shorea robusta) is being tested for its suitability for the preparation of strawboards.

5. Pressed boards were prepared from Dendrocalamus strictus (bamboo) by steaming the bamboo chips in the Asplund Defibrator at various temperatures.

6. The other investigations that were carried out during the year under report are:—

(*a*) Influence of lignin contents of chemical pulps on their keeping properties.

(*b*) Influence of the rate of growth of bamboo on its chemical constituents and pulping properties.

(*c*) Comparison of China clay and talc for retentivity, capacity and strength properties in papers.

(*d*) The testing of sabai grass sent by Messrs. Upper India Couper Mills Ltd., Lucknow.

(*e*) Particulate filters.

(*f*) Beating characteristics of bamboo pulp.

(*g*) Rayon grade pulp from Dendrocalanus strictus (bamboo) and Boswellia serrata (salai).

(*h*) Carboxyl content of pulps.

7. Six species of raw material useful for paper making work examined for their chemical constituents.

8. Samples of papers sent by various parties were tested and reports of test were sent to them.

9. "Technical Abstracts" were supplied to the paper and board mills which pay the voluntary contribution.

10. Apprentices were taken as usual for technical training.

Chemistry of Forest Products

1. Aquilaria agallocha Roxb. :—In view of a large and popular demand for agar attars in India, Near East and middle East countries, highly concentrated agar attars on the basis of E. I. sandal-wood oil and high-boiling sesquiterpenes of Sandalwood oil have been prepared and their physical properties studied. These attars have been very much appreciated for aesthetic purposes and also for scenting betel leaves and tobaccos.

The solvent extraction of agar wood with alcohol yielded 15 per cent. of the total resinoids but the essential oil obtained therefrom has been found to be of a disagreeable odour.

2. Anisochilus carnouss Wall.—This species, once a forest and field commodity, is now reported by the Forest Departments to have been reduced to a pot cultivation only.

Two specimens gave on examination 0.0755 per cent. and 1.0834 per cent. of a raddish brown oil with leafy-phenoilic odour. The species does not hold out any hope of its economic exploitation.

3. Saussurea lappa C. B. Clarke. With a view to recover the costus oil going waste due to its rapid amulsification with the distilling waters during the course of water and steam distillations of the roots, an Oil Trap of very simple and efficient design has been evolved to give a yield of 3.65 per cent. of the oil against 1.32 per cent. obtained without its use from a specimen of roots with about 4 per cent. of the oil.

Highly concentrated costus attars have been prepared on the basis of E. I. Sandalwood oil and the high boiling sesquiterpene fractions of sandalwood oil with a view to popularise their use in perfumery and industry.

These attars of refined and fixed adour rich in costus aroma are nowunder examination for their industrial potentiality.

4. Vetiveria zizanioides (Linn.) Nash.—Samples from about a dozen places all over India were secured and examined for their essential oil content with and without soaking them in water. The yield of essential oil varied from 0.384 per cent. to 0.098 per cent. in unsoaked roots and from 0.054 per cent. to 0.22 per cent. in soaked roots from the same stocks. The arome of the oil from unsoaked roots was found to be bland and dull and of the oil from soaked roots was characteristic of the true khus tone, highly fixed and pleasant. Prolonged soaking in water, however, was found to deteriorate the oil content of the roots.

A large scale distillation of vetiver roots from Bharatpur gave on steam distillation 1.17 per cent. of the essential oil employing the principles of cohobation and the Oil Trap developed at this Institute. This is perhaps the highest yield ever reported from any Indian vetiver roots.

The solvent extraction of vetiver roots with alcohol gave about 2.45 per cent. of total resinoids yielding on further processing 0.08 per cent. of steam volatile oil and 0.56 per cent. of an oil soluble in petroleum and sulphuric ethers. Both the oils showed no resemblance, whatsoever, with the true khus oils.

5. Sterculia aeurens Roxb.—The higher "solid" acid fractions on fractional crystallisation from acetone were found to yield stearic and lignaceric acids. From the unsaponifiable matter a sterol m. p. 129°C. and a small amount of a high molecular weight hydrocarbon have been isolated. The fatty oil belongs to the non-drying class and is edible.

6. Cornus capitata Wall. The chemical and physical constants of the fatty oil from the seeds have been determined. The oil is a drying oil but its low content in the seeds (9 per cent.) makes it uneconomical for exploitation.

7. Non-cereal Foods—(Dioscorea hispida Dennst., D. bulbifera Linn., D. alata Linn. and D. sativa Linn.) : In view of the shortage of normal food grains in the country, several experiments have been conducted with the object of discovering non-cereal food materials from apparently non-edible sources. In this connection several tubers of Dioscorea have been examined, manely, Dioscorea hispida Dennst., D. bulbifera, D. alata Linn. and D. sativa Linn. All these tubers contain nearly 60 to 80 per cent. starch (dry

weight basis) but most of them are non-edible in the native condition, since some of them contain poisonous alkaloids like dioscorine and others contain calcium oxalate and some volatile acrid principles. A method has now been developed for eliminating the poisonous principles and rendering the tubers edible. It involves the treatment of the root powder with saturated lime water containing 0.005 per cent. of potassium permanganate. The excess of the permanganate is removed by treatment with hydrochloric acid and sodium bisulphite. The resulting powder, which becomes completely free of the alkaloids, may be used in admixture with wheat atta for the preparation of rotis, chapatties, etc.

Starches from D. hispida and D. bulbifera have also been isolated and their properties studied.

8. Urtica parviflora Roxb. Clerodendron infortunatum Gaertn. and Spinaceae oleraceae: The chlorophyll pigment isolated from these leafy sources for colouration of vanaspati is found to contain 40—50 per cent. of pure chlorophyll. The coloiration of vanaspati with chlorophyll is made very simple and economical by a process of direct extraction of the leafy material with the fat itself. The optimum time and temperature for the direct extraction have been determined. A preliminary wetting of the leafy material with a small quantity of alcohol and then extracting it with a fat at 40 °C. for 10 hours yields the maximum intensity of yellowish green colour.

Copper chlorophyll (chlorophyll in which magnesium is replaced by copper) concentrates in groundnut oil have been prepared by a simple method. A direct and economic method is also described for the preparation of copper chlorophyll of 130—140 per cent. tinctorial value from leaves of the Indian Stinging Nettle (Utrica parviflora Roxb.) This method eliminates the isolation and purification of chlorophyll and thus saves much in labour and production costs of copper chlorophyll.

9. Tamarindus indica Linn.: Tamarind seed testa dye has been prepared by a direct extraction of the testa powder with acetone or alcohol. Experiments are still in progress to compare the solubility and other characteristics of the dye with those of the dye prepared by Krishna's method.

10. Shorea robusta Gaertn.:—The results of a preliminary chemical analysis of the saw dust of this important wood from the Dehra Dun region have been tabulated.

11. Chenopodium ambrosioides Linn. var. anthelminticum Gray.—The normal distillation practice gave in this case an essential oil with a low specific gravity, low ascaridol content and low solubility. Specially controlled distillation of the material, within a short time and keeping the condenser no cooler than is barely necessary to effect the condensation, gave a very much higher yield of 1,73 per cent. on air dry basis of an essential oil with an ascaridol content of 76 per cent. and other physical values falling within the range prescribed by the B. P. and U. S. P. Further examination of the oils were made separately from fruiting tops and leaves of this plant.

12. Pinus longifolia (chir pine)—Fresh green chir needles have given 0.142 per cent of an essential oil.

13. Bursera deplechiana Poiss. ex. Engl.—The essential oils from the wood, leaves and berries of linaloe trees grown in Bangalore have been examined for their physico-chemical values.

14. Homalomena rubescens Kunth : The roots of this plant as obtained from Assam have given an essential oil from 4.6 per cent. to 6 per cent. air-dry basis. Its physico-chemical values and chemical composition have been studied. The oil has been found to contain about 40 per cent. of l-linalol associated with small content of terpineol, esters, aldehyde and ketone.

15. Cedrus deodara Loudon.—The sapwood, white heartwood, brown heartwood, selected brown highly resinous heartwood, sawdust from the heartwood and wood shavings from the heartwood as well as deodar needles have been examined to give, on zero moisture basis, 0.25 per cent., 0.2 per cent. 4-8 per cent., 12.5 per cent. 4.65-5.5 per cent. 4.5 per cent. and 0.15-0.2 per cent. of the essential oils respectively. The heartwood oils from brown stocks contain 0.5-4.0 per cent. of a phenol besides 1.5-4.0 per cent. of aldehydes and ketones. The white heartwood, sapwood and needle oils exhibited no phenols. Needle oil indicated no ketone.

16. Ocimum kilimandscharicum Guerke.

(*a*) Two harvests of ocimum leaves from the Bibiwala plantation (78 maunds air dry) were distilled on a pilot plant scale for their camphor and Camphor oil contents (yields 1.31 per cent. each.)

(*b*) A new camphor condenser.—A portable drum still, capable of holding 40 lbs. charge of Ocimum leaves, and an efficient condenser, designated FRI Camphor condenser, have been designed and faricated for use as a cottage industry unit for camphor distillation. It consists of a vertical cylinder double jacketted for the circulation of cooling water to congeal the camphor vapours on its sides, while allowing the oil and water vapours to flow down after condensation to be received in a receiver below. This unit has been found quite suitable for the manufacture of Camphor on a cottage scale basis.

(*c*) Purification of camphor by sublimation: A simple sublimation apparatus has been designed and described in which camphor is purified by sublimation. It takes a charge of 5 pounds of crude camphor and within 30 hours, recovers 95—98 per cent of pure camphor (70—75 per cent. in snow flake forms and the rest as scales on the sides). Conditions for working this unit have been standardised and described.

(*d*) Ocimum kilimandscharicum Guerke.—The essential oil from the leaves of this plant has been taken up for its study of physico-chemical values and chemical composition.

The low boilding fraction of the oil is being worked up for use as a solvent for industrial stains and lusters.

17. Mallotus philippinesis Muel. Arg.—Method has been described for the extraction of kamala oil from the seed kernels without the use of the usual volatile solvents, *e.g.*, benzene, toluene, etc. This is actually done by the use of suitable fatty oils as solvents. The extract of kamala oil has been converted into a new paint oil "Friol" and has been found suitable as such for making wrinkle finishes. Kamala oil in conjunction with non-drying fatty oils has been found to yield on eating products suitable for making fatty oil substitutes of petroleum jellies. All the three aspects of the work have been convered by provisional Indian patents. Over 15 gallons of Friol was prepared and sent to various firms for tests and report.

18. FRI Process of extraction of oils and fats.—This new process of oils and fats extraction consist in heating or " Friing " the seed kernel powder with twice the quantity of suitable fatty oil for about an hour at 100—110°C. and centrifuging the resulting paste. The kernel cake separated from the oily matter is again extracted with a fresh quantity of the solvent oil in the same manner. The combined oil extracts cooled to 0°—5°C. to solidify the fat in the oily matter and then separated by centrifuging. The kernels cake contining 30 per cent. of the solvent oil is filterpressed to recover 20 per cent. of the oil which is reused in the process.

19. Sal fat from the seeds of Shorea robusta Gaertn.—Complete extraction of Sal fat has been achieved by the FRI process described above.

20. Analysis of Sugars and Uronic Acids.—Employing the horizontal migration method of paper chromatography (already reported last year), a convenient method of separating and identifying galacturonic and glucuronic acids has been worked out. Ethyl acetate—acetic acid-water (3 : 1 : 3 by volume) has been found to be the suitable solvent for the separation. Each acid has got its own characteristic circular RF value which enables its identification.

Similarly the barium salts of the uronic acids give good separation with ethyl acetate-pyridine-water (2 : 1 : 2 by volume) as the solvent.

21. Research Student.—Shri Gurhardial Singh continued his work on the Cedrus deodara (Loudon), oil for the M.Sc., degree of the Punjab University.

22. I.S.I. Draft Specifications.—Several draft specifications on essential oils and one on T. K. P. have been prepared for I. S. I.

23. Publications: Twenty three research papers have been published in various scientific journals.

Minor Forest Products

(A) Economic Survey of Commercial Minor Forest Products:

1. A survey of artemisia in the Kishtwar Forest Division of Jammu and Kashmir State was carried out and it has been found that it would be possible to collect from this area about 40 tons of good quality Artemisia brevifolia Wall. annually, yielding well above 1 per cent of santonin.

2. A number of samples of ephedra from the Punjab, Himachal Pradesh, Uttar Pradesh and Sikkim were examined. Although some of the samples have given excellent yields of total alkaloids (up to 2.2 per cent.) and ephedrine hydrochloride (up to 1·78 per cent.), yet adequate quantities of good quality ephedra can be available in India only if suitable strains are cultivated, the natural supplies being inadequate and found in remote areas.

3. Investigations on avaram bark, tamarind seed, bhilawa nut, rosha grass and gum karaya were continued in Bhopal, Madhya Pradesh, Madhya Bharat, Orissa and Uttar Pradesh, and useful information was collected.

(B) Cultivation of Economic Plants :

1. Ocimum kilimandscharicum Guerke :—About 1½ acres of the plantation were maintained for seed supply, and 14 lbs. of seeds were collected. Technical help was given to a private party for raising a large-scale plantation, and the October and December harvests were distilled.

It has been possible to obtain as much yield of camphor and oil by distillation of ocimum leaves in a direct-fired drum still on a cottage-scale basis as was obtained by steam distillation.

Statstiscally laid out cultural experiments were started in Bibiwala camphor plantation and in the F.R.I. with a view to find out which of three methods direct sowing, planting out direct from original nursery beds, are planting out after transplanting in nursery ones would give the best yield of leaves. All these experiments were conducted at the spacings of 2′×2′ and 2′×1′

2. Cultural experiments were also continued on other plants of economic importance. The more important among them were Rauwolfia serpentina Benth. ex Kurz Cymbopogen nardus Rendle, Chenopodium ambrosioides Linn. var anthelminticum Groy, Eucalyptus spp., and Rhamnus purshiana DC. The fibrous root branches of rauwolfia, which are at present discarded, also contain a high proportion of alkaloids and could be marketed. A high yield of chenopedium oil which satisfies B. P. and U. S. P. specifications for ascaridole content has been obtained, probably or the first time in India.

HARCOURT BUTLER TECHNOLOCICAL INSTITUTE, KANPUR

Chemical Technology

1. B. S. Mathur, S. N. Ghatak, Research Asstt. and Dr. D. R. Dhingra, Principal, Preparation of Roller Skin for Textile Industry, begun in April 1950, completed in April, 1953, to be Published shortly. (Large number of Roller Skins are being imported to cover spinnning rolls in Textile machinery. The foreign rolls are made of synthetic rubber, Cork and filter. As synthetic rubber and cork are not available in India hence waste Crape rubber was selected as the basic raw material. Experiments to manufacture rolls as a substitute of foreign rolls were carried out by mixing different proportions of different fillers.)

2. S. N. Ghatak, Research Asstt. and Dr. D. R. Dhingra, Principal, A study of the possibilities of Sugar from Meda roots available in the Hilly districts of Uttar Pradesh, begun in July, 1950 and completed, to be published shortly.

3. Dr. D. R. Dhingra, Principal with G. N. Gupta, Research Chemist, and U. N. Shukla, Research Asstt., The Otto of Champa, begun in 1950, completed in 1952, Paper sent to Indian Science Congress for publication.

4. B. N. Gupta, Research Scholar with G. N. Gupta, Reseach Chemist, and Ganesh Chandra, Research Asstt., Palma Rosa plantation in Uttar Pradesh, For the award of A.H.B.P.I., Diploma, begun in 1950, completed in 1951, for publication, Paper sent to Indian Science Congress.

5. B. P. Singh with Dr. M. S. Bhatnagar Research Chemist, Organolites from Indian tannins, For the award of A.H.B.T.I., Diploma, begun in 1950, completed in 1950, Published in Journ. Scientific and Industrial Research Jan, 1951, No. 10, B p. 25. (Sulfonated products from Katha and Cutch have been prepared. Adsorption of calcium and magnesium salts has been studied and results comparable to foreign products have been obtained.)

6. Dr. D. R. Dhingra, Principal, and M. G. Gupta, Research Asstt. A new process for the Preparation of Chemical Gold-Thread. For

F.H.B.T.I., Diploma, begun in 1951, completed in 1952, Published in Proc. 39th Indian Science Congress, Calcutta, 1952 Abs. III p.143-144. (A new chemical process for the preparation of chemical Gold-thread has been evolved using cellulose-nitrate lacquer bath in combination with suitable plasticiser, amyl acetate soluble red and yellow, dyes and a blend of solvents. The process has already been adopted by a few gold thread manufacturing concerns of Banaras.)

7. G. C. Joshi, *Guides*: Dr. D. R. Dhingra, Principal, and M. G. Gupta, Research Asstt., "The Electro-Polishing of Aluminium", For F.H.B.T.I., Diploma, begun in 1951, completed in 1952. (It has been found that electro-polishing of 98.9 per cent. purity aluminium, if carried in a bath utilising O-phosphoric acid, normal-butyl alcohol and water using a c.d. of 45 amps/ft.^{2} at 40—50 °C. can give a reflective surface of 81.9 per cent. reflecting whereas the mechanically polished samples have a reflectivity in the vicinity of 68 per cent. only.)

8. S. K. Bose, *Guide*, Dr. J. B. Lal, Head of Chemical Technology and Geneal Research Section, Studies in the Isolaton of curcumin from curcume Longa, for M.Sc., begun in 1951, completed in 1952. (A new and improved method for isolation of curcuming in an yield of 1.1 per cent. has been worked out.)

9. B. N. Gupta, with Dr. J. B. Lal, Head of Department and U.N. Shukla, Research Assistant, Production of Isoamyl Salicylete, begun in July 1951, completed in 1953. (It is used in considerably amount in soap perfumes as ingredient of incarnation of perfumes attractant in poisonous faits for moths of tobacco and tomato using azeltropic method of production it has been obtained in an yield of 88 per cent. of the theoretical. A complete study of the various factors such as proportion of reactants, con. sulphuric acid catalyst, etc., has been made.)

10. M. C. Bhattacharya, *Guides*: Dr. D. R. Dhnigra, Principal, and M.G. Gupta, Research Asstt., (*i*) "Producion of Photographic Prints on Anodised Aluminium," For the award of A.H.B.T.I., Diploma, begun in 1950, completed in 1951, Published in Jour. and Proc. Inst, Chem., India, Parts III & IV, Sept., Dec. 1951, p. 177-189, (These prints will be more durable as compared to the ordinary paper prints and may be used for the preservation of important photographs. It has been found that the developing out paper emulsions are most suited for

the purpose. The optimum composition of the emulsion and its working details have been studied.

(*ii*) "Anodisation and Multicolouring of Pure Aluminium" For the award of A.H.B.T.I., Diploma, begun in 1949, completed in 1950, Published in Jour. and Proc. Inst. Chem. Vol. XXIII, Parts III & IV, Sept.-Dec. 1951, p. 118—134. (The two newly discoveed properties of the aluminium oxide films have been successfully employed in the production of multi-coloured effects on anodised aluminium sheets both by super-imposition of colours and bleaching process and as many as five different shades have been obtained simultaneously.)

11. Dr. D. R. Dhingra, Principal, N. G. Gupta, Research Asstt., "Studies in Reflex and Contact Copying, 'For F.H.B.T.I., begun in 1950, completed in 1951, Published in Jour. and Proc. Inst. Chem. India, Part I Vol. XXIII, March 1951, p. 36—48,(A new technique for preparing contact prints from orginals having printed matter on one side only has been developed and its mathematical explanation worked out which is supported by experimented evidence.)

12. M. C. Bhattacharya, *Guides*: Dr. D. R. Dhingra, Principal, M. G. Gupta, Reseach Asstt., "Preparation of Photographic Gelatin from Hides," For the award of A.H.B.T.I., Diploma, begun in 1949, compleed in 1951, Published in Jour, and Proc. Inst. Chem., India, Vol. XXIII, Parts III & IV, Sept.-Dec. 1951, p. 161—172, (Photographic Gelatin is an indispensable ingredient in the preparation of photographic emulsions. A maximum yield of 44.7 per cent. of photographic gelatin on the weight of dry limed hides has been obtained and the samples prepared, compare well with the best foreign samples.)

13. G. C. Joshi, *Guides*: Dr. D. R. Dhingra, Principal, M. G. Gupta, Research Asstt., "Studies in the preparation of Photographic Printing Papers," For the F.H.B.T.I., Diploma, begun in 1952, completed in 1952, Published in Proc. 39th Indian Science Congress, Calcutta, 1952, Abs. III, p. 144. (The details of the process or closely guarded secret of the foreign firms. A detailed study regarding the suitabilty of the base paper, initial coating, suitable substratum, temperature and humidity, and composition of the developing out papers has been made. Both gaslight and Bromide papers of a fairly good quality has been successfully prepared on a laboratory scale.)

14. Dr. D. R. Dhingra, Principal, M. G. Gupta, Research Asstt., " Studies in the preparation of Photographic Plates," For F.H.B.T.I., Thesis, begun in 1949, completed in 1950, Published in Proc. 39th Indian Science congress, Calcutta, 1952, Abs III, p. 142—143, (An extensive study has been made regarding the selection ofpropertype of photographic gelatin, emulsion technique, coating conditions, optimum temperature and Humidity use of colour sensitislers, etc. and it has been possible to reach a speed upto 800 H. D.)

15. J. P. Mittal, Research Scholar, *Guides*: Dr. D. R. Dhingra, Principal, and S. N Kapoor, Research Cemist., Preparation of Ethyl chloride Acetic anhydride, For the award of Fellowship Diploma of H:B.T.I., begun in 4th October, 1948, completed in 30th October, 1950. Sent for publication in Indian Science Congress 1953. (Ethyl chloride :—It is used in the plastics industry as a ethylating agent in the synthesis of dyestuffs and drugs and also in refrigeration. Prepared by passing dry Helgas over alcohol using anhydrous Zinc chloride as a catalyst.)

Acetic anhydride : Main use is in plastics, cellulose acetate industry and synthetic dyes sulphur chloride and capalyic method have been tried, the former gives 46 per cent yield of purity 97.56 per cent. while the latter 85 per cent. of purity 35 per cent. strength.)

16. R. P. Aggarwal Research Scholar, *Guides*: Dr. D. R. Dhingra, Principal and S. N. Kapoor, Reseach Chemist., Preparation of Gammexane, For the award of Associateship Diploma of H.B.T.I., begun in 1949, completed in 1950, Published in Journal of Indian Chemical Society Ind. New Edition Vol. XIII, No. 1, March 1951, p. 247—254, (Gammexane has been prepared on the laboratory scale from Benzene with Mg. and Sb. as calatysts. 17 per cent. yield of the isomer has been obtained with Hg.:Sb. ratio of 1 :4. Disposal of chlorine from electro lytic caustic soda is a problem and the preparation of gammexane will help in solving it to some extent.)

17. S. N. Kapoor, Research Chemist, and Dr. M. S. Bhatnagar, Research Chemist, Estimation of P. A. S., begun in 1950, completed in 1951, Published in Current Science, Sept. 1951. (*Estimatin P.A. S.*: Samples of P. A. S. from different sources were analysed by electrometric titration by usual N-10 solution of sodium hydroxide. On calculation the values obtained agree fairly with those given by the manufacturer.)

18. H.K. Roy Choudhry, Guides: Dr. D.R. Dhingra, Principal, and G.N,

Gupta, Research Chemist, Manufacture of furfural from Agricultural wastes, For the award of A.H.B.T.I., Diploma, begun in 1950, completed in 1951, Published in Manufacturer Feb. 1951, Vol. II, No. 10, p. 12—25. (It is an important chemical used as a refining agent, solvent, preservative and antoxidant. It has been successfully prepared from agricultural waste materials such as maize, bajra, baggase, rice husk etc., and working detail ascertained.)

19. S. N. Ghatak, Research Staff, Research Assistant and Dr. D. R. Dhingra, Principal, Disposal of the Trade effluents, begun in April 1950, and completed, to be published shortly. (The trade effluents from different types of factories such as textile, Leather tannery, Dairy, Sugar, Distellery, Straw-Board, paper, Glue, Bacon factories, etc., etc., were analysed and experiments on their treatment were carried out. Very encouraging results were obtained and a treatment plant has been designed.

20. J. N. Mehrotra, Guides, Dr. D. R. Dhingra, Principal, and G. N. Gupta, Research Chemist, Otto of Jasminum Grandiflorum Part I and Part II, For the award of A.H.B.T.I., Diploma, begun in 1950, completed in 1950, Published in Indian Soap Journal (Part I), p. 235 Vol. XVI, March, 1951, Part II ; I.S. J. Vol. 16, p. 259, April, 1951. (The ottos are used for blending of high class perfumes and for toilet and hair oil preparations. Different methods were tried for the extraction and steam distillation, etc., The oil has been chemically examined and its constituents determined.)

21. Dr. D. R. Dhingra, Principal, G. N. Gupta, Research Chmist and U. N. Shukla, Research Asstt., Chemical examination of the Otto of Bela, begun in 1950, completed in 1951, Paper has been sent to Perf. and Essential Oil Records for publication. (The otto of bela was prepared for the first time in India, by distillation of flowers at Kanauj, Ghazipur, Sikandarpur (Ballia), etc. It has been found to contain methyl anthranilate, Indole, benzyl acetate, benzyl alcohol, etc. The yield of otto is 0.02 to 0.03 percent. on the weight of fresh flowers.)

22. Dr. D. R. Dhingra, Principal, G. N. Gupta, J. C. Jain, and U. N. Shukla, The otto of Randanus Odoratissimus—I—Kewda, begun in 1950, completed in 1951, Published in Perfumery and Essential Oil Record, London, April 1951. (The otto of kewda was prepared in large quantities at Kotapalli (Dist. Ganjam, Orissa). Its physico-chemical constants have been determined and reported. The yield of otto is about 0,03

per cent. Further work on its chemical constitution has nearly been completed and the paper will be sent for publication.)

23. P. C. Nigam, Under Dr. D. R. Dhingra, Principal, and Dr. M. S. Bhatnagar, Research Chemist, (*i*) Lignin recovery from soda black liquor, for A.H.B.T.I., Diploma, begun in 1950, completed in 1950, Published in Indian Pulp and Paper Vol.V, Nov. 1950, p. 223. (Large amount of alkali black liquor is available as a waste product of paper factories. Optimum conditions to separate about 72 .per cent. of lignin by passing CO_2 through the liquor have been worked out. Properties uses of lignin have also been studied.)

(*ii*) Ion exchanger form Katha and Cutch, for A.H.B.T.I., Diploma, begun in 1950, completed in 1951, Published in Jour. Applied Chemistry London, Oct. 1951. (Various sulfonated and modified resins have been prepared from Katha and Cutch. Adsorption of organic and inorganic acids and bases has been studied. The results obtained compare favourably with the foreign products available in the market.)

24. S. N. Sahai, under Dr. M. S. Bhatnagar, Research Chemist, (*i*) Concentration of dilute for maldehyde solutions, for A.H.B.T.I., Diploma, begun in 1950, completed in 1951, communicted to Jour. Scientific and Indl. Research. (Dilute solutions of formel dehyde were concentrated using varying amounts of anhydrous sodium sulphate, calcium chloride and sodium chloride. It has been found possible to obtain 40 per cent. concentrated solution of formal dehyde using 20 per cent. sodium sulphate, 20 per cent. $Ca\ cl_2$ or 30 per cent. sodium chloride. Solutions obtained with sedium chloride were Turbid but they can be used for commercial purposes.)

(*ii*) Preparation of Hydroxybenzy alcohol, for A.H.B.T.I., Diploma, begun in 1950, to be completed in July 1953, by Communicated to Jour. Scientific and Indl. Research. (Phenol and formaldehyde in equimolar proportions were reacted in presence of NaOH at room tempt. for 24 hours. From the reaction mixture resin was extracted with ether which was found to contain about 50 per cent. free phenol. From this resin hydroxylbenzylalcohols were crystallised out. It has been found possible to extract mono—: di-and Trialcohols.

(*iii*) Studies on kineties of phenolformal-dehyde resin, for A.H.B.T.I., Diploma, begun in 1950, completed in July, 1950, communicated to Jour. Scientific and Indl. Research, (Kineties between phenol and formaldehyde were studied using ranging amounts of catalyst. The curves between time and forms-aldehyde reacted show that four definite straight lines are obtained. This shows that there are four reactions taking place in the mixture each line representing one reaction. Attempt to crystallise compounds at each break failed but it has been found possible to isolate four definite compounds at the end of the reaction from the mixture.)

25. B. P. Singh, Guides, Dr. D. R. Dhingra, Principal and M. G. Gupta, Research Asst., " Chemical Toning of Photographic Prints," For the award of H. B.T.I., Diploma, begun in 1950, completed in 1951 Published in Jour. and Proc. Chem., India, Part I, Vol. XXIII, March 1951, p. 9—35. (Toning means modifying the colour of a developed silver image by a change in its chemical composition. A new dye toning process has been developed by which prints of double shades and pleasing appearance have been produced.)

Oil Chemical and Technology

1. Om Prakash, Head of Oil Sec., A. C. Gupta, Lecturer, Oil Chem. and Technology, and S. N. Chatterjee, Research Asstt., Tailor made drying oil or Alcohol soluble boiled oil, begun in 1950, completed in 1950, Published in 6th Proc. of the Oil Technologists Asso. India, 1950. (Shellac the only natural hard resin available in India is insoluable in Linseed oil. The attempt was to make the latter compatible with shellac Catalyst employed and optimum conditions of reaction have been studied. A stoving lacquer has been successfully prepared.)

2. Om Prakash, Head of Oil Sec., A. C. Gupta, Lecturer, Oil Chem. and Technology and V. D. Athawale, Research Asstt., Air drying oil modified alkyd resin, begun in 1950, completed in 1952, Communicated for publishing in "Paint Technology," Lodnon. (The processes of manufacture of synthetic resins are well guarded secrets and covered by patents. Work was undertaken with a view to bring the technique of alkyd resins to light conditions of reaction using indigenous products, *viz.*, glycerol, Pthalio anhydride, castor oil have been studied. Resin successfully prepared and tested in defence laboratories was found to be excellent.)

3. Om Prakash, Head of Oil Sec., A. C. Gupta, and B. D. Seth, Research

Asstt., Activated carbon from Linseed Pod husk, begun in 1951, completed in 1952, Communicated for publication to "Science Congress" 1953. (The bye-product husk, in the development of Linseed fibre, has been utilized in the preparation of activated carbon for bleaching oils, Suitable activator studied. Pilot plants scale experiments conducted.)

4. Om Prakash, Head of Oil. Sec., A. C. Gupta, Lecturer, Oil Chem., Brahma Prakash, Research Asstt., A ready method for the detection of small quantities of mineral oil, in vegetable oils, begun in 1952, completed in December, 1952. (Holde's Test was found to detect no less than 4 per cent mineral oil in mustard oil. The test has been modified so that it is capable of detecting upto 1 per cent. mineral oil in mustard oil. The test is now being applied to other oil adulterated with different brand, of mineral oils.)

Fats and Waxes

1. Om Prakash, Head of the Oil Sec., Atma Ram, Research Chemist., and Braham Prakash, Research Asstt., Preparation of Medicinal Castor oil, Published in Proc. 6th annual convention and Jour. Oil Technologists Asso. India, Kanpur, 1950, Vol. 6. (The work was under taken to evolve aprocess which could be adopted on cottage scale. Good quality decoriticated castor seed was pressed in cold and the oil so obtained was bleached with Fuller's earth and carbon. 1 per cent. rectified spirit checks rameidity. The oil compares well with foreign samples and is even better.)

Cottage Oil Industry

1. Om Prakash, Head of Oil Sec., T.R. Sharma, Research Chemist., and Abdul Wahab, Instructor, Design of a small seed cleaning machine worked by hand, begun in 1951, completed in 1951. (It is a handy appliance for cleaning oil seeds on cottage industry scale.)

Chemistry

1. B. K. Lohani, with B. Biswas, Research Chemist., Examination of (wild) Bhang fibre, for A.H.B.T.I., Diploma, begun in 1950, completed in 1951. (Fibres from wild variety of Bhang plant have been isolated by retting. The chemical and physical

examination of the fibre performed and compared with fibre from the cultivated hemp. Staining and microscopic examination was also done.)

2. B. K. Lohani, with Dr. D. R. Dhingra, Principal, and B. Biswas, Research Chemist, comparative study of Agave fibre prepared by different methods, for A.H.B.T.I., Diploma, begun in 1950, completed in 1951, Published in Jour. and Proc. Inst. Chem. (India), Vol. XXIV, Part I, Jan. 1952. (Agave fibres prepared by three different methods have been physically and chemically examined Microscopic examination have also been undertaken. Suitable explanation of production of weak fibre by retting has also been given.)

3. Dr. D. R. Dhingra, Principal, B. Biswas, Research Chemist, and G. B. Lal Tech. Asstt., Lady's finger—A dual purpose crop, begun in 1950, completed in 1951, Published in the Indian Textile Jn. Januury 1952. (Beside the edible pods a useful fibre can also be produced. Yield of fibre is 2.3 per cent. on the weight of freshly harvested stem and 10.8 per cent. on the sun-dried stem. Yield of fibre per area is about 2.5 mds. As much as 85 per cent. of this fibre can be mixed with jute for standard sacking.)

4. B. Biswas, Research Chemist and V. N. Nigam, Research Asstt., (*i*) Cottonisation of linseed fibre, begun in 1950, completed in 1951. (By suitable chemical treatment linseed fibre could be bleached softened and cottonised for admixture with cotton. The economies of the process is also studied.)

(*ii*) Wool like fibre from linseed fibre, begun in 1951, completed in 1952. (By suitable chemical treatment a wool like finish can be given to the linseed fibre. The treated fibre can be mixed with wool for production of blanket, etc., The economics of the process is also studied.)

Mechanical and Engineering

1. Dr. D. R. Dhingra, Principal, and B. Biswas, Research Chemist., (*i*) Deseeding machine for linseed crop, begun in 1950, completed in 1951. (The process to be patented). (By suitable mechanical means the seed from the linseed crop can be removed without damaging the straw. A machine has been designed for the above purpose.)

(*ii*) Fibre extracting handmachine, begun in 1949, completed in 1951, (The process to be patented). (By suitable mechanical means fibre from the stem of linseed, sunn plant and other can be extracted. A machine has been designed in the institute for the above purpose.)

Chemistry and Technology of Oils and Fats

1. Shyam Narain Saxena, with Om Prakash. Head of Oil Sec. and T. R. Sharma, Research Chemist. "Utilisation of neem fruit for its seed and oil," for F. H. B. T. I., Diploma, begun in 1950, continued, Read at the annual convention of oil Technologists Aso. to be published in their journal. (Neem fruit was processed to get neem seed of good quality. The oil obtained from the seed had much less unpleasant neem odour and colour. The Indian Central oil Seeds Committee has appreciated the work and sanctioned funds for designing pilot plants for depulping and drying and decotecating neem fruit.)

2. Amanulah Khan, Guides: Om Prakash, Head of Oil Sec. and T. R. Sharma, Research Chemist., "Examination of various oil cakes produced in Uttar Pradesh with a view to find out their Scientific utilisation, for F.H.B.T.I., Diploma, begun in 1949, completed in 1952 Sent for publication in Institution of Chemists (India), Journal, (As oil cakes constitute an important by-product of the oil crushing industry so its systematic study is very necessary. With this end in view the different oil cakes namely mustard, lineseed, castor, groundnut, til, mahua, etc., collected from different centre of U. P. were carefully analysed for their complete chemical composition.)

5. Narendra Gupta, with Om Prakash, Head of Oil Sec., and T. R. Sharma, Research Chemist, Design of a small solvent Extraction Plant. (The solvent extraction plant has been designed and trials of its working are to be taken on the construction of a shed to house the plant for which Government has approached for funds.)

Cottage Oil Industry

1. Om Prakash, Oil Expert, T. R. Sharma, Resh. Chem. and Abdul Wahab, Instructor, Design of a small hand worked filter press. (The filter press is for use in cottage oil industry. It has a filtering, capacity of 2-3 mds. of Oil per hour and costs Rs. 250 the design was carried out under a grant from the Indian Cent. Oil Seed Committee.)

Chemistry and Technology of Oils fats and Waxes

1. Om Prakash, Head of the Oil Section, with Atma Ram, Research Chemist, and Brahma Prakash, Research Asstt., Purification of Mustard oil Contaminated with Argemone oil, Published in Current Science, January 1951. (When mustard oil contaminated with argemone oil is vigorously shaken with 20 per cent. ferric chloride solution (10 per cent. on the weight of oil) and oil separated on hot water bath, the resulting oil does not give test for arguman oil. The purification is effective upto 5 per cent. contamination of argemone oil.)

2. S. N. Saxena, Guides: Om Prakash, Head of the Oil Section, Atma Ram, Research Chemist, and Brahma Prakash Research Asstt., Technical uses of Argemone oil, For the award of F.H.B.T.I., Diploma to be published in the Proc. of 40th Session of the Indian Science, Congress 1953. (The work was undertaken to find out legitimate uses of the toxic argemone oil. When mixed with oils in suitable proportions it can be used in the preparations boiled oils, soaps and varnishes.)

3. Om Prakash, Head of the Oil Section, Atma Ram, Research Chemist, Brahma Prakash, Research Asstt., and M. K. Singh, Tech. Asstt., Detection of groundnut oil in mustard oil, to be published in the Proc. of 40th Session of Indian Science Congress, 1953. (Bellier's turbidity temperature of pure samples of mustard oil and ground nut oil and also of mixture of ground nut oil and mustard oils in different proportions have been determined. The conclusions drawn aer useful in detecting adulteration of ground nut oil in mustard oil.)

4. Om Prakash, Head of Oil Section, Atma Ram, Research Chemist, and V. D. Athawale, Research Asstt., Isomerization of Linseed oil, Read at the Symposium on Paints, and Varnishes at the National Chemical lab. Poona, held in March 1952. (Tung oil is superior in some properties to lineseed oil due to presence of elaeo stearic acid which is tri-un-saturated fatty acid having its double bonds in conjugated positions. Linseeed oil can be modified in this respect by isomerizing the oil whereby double bonds in the fatty acids move in conjugated position. The work is in progress.)

Applied Chemistry

1. P. N. Kacker, Research Scholar, with Dr. D. R. Dhingra, Principal, and S. N. Kapoor, Research Chemist. " Preparation of Ethoxy,

methoxy Chlors and various other allied products," For the award of the fellowship Diploma begun on 11th July, 1951, likely to be completed in 1953. ("Studies on the preparation of Meth oxychlor" sent for publication in the Journal of Institution of Chemists, India 1952. "Contact Insecticidal activity of some alkoxy analogues of D. D. T." sent for publication in the Indian Science Congress Association Proceedings of 1953." Preparation of other analogues will shortly be published in the Jour. of Science and Culture India. The authors studied the preparations of Methoxy chlor which was best prepared at a low temp. Of 5-10 °C using 66 °BeH_2SO_4 as a catalytic agent. In the preparation of other analogues the difficulty arose due to the nonavailability of Ethoxy propexy benzene ect. in India, but the authors prepared the chemicals in the Lab. and ultimately prepared several other analogues. Besides this they found out the texicities of analogues by biological assaying.)

2. V. Paul, Research Scholar with Dr. D. R. Dhingra, Principal, and S. N. Kapoor, Research Chemist, Preparation of chrome compounds, *e.g.*, chromic acid. Chrome alum and chromic anhydride, begun in 17th January, 1949, completed in 18th July 1950, sent for publication in Indian Chemical Society New addtion. These salts are largely used in textile leather, paints, glass ceremices and electroplating industries. (*i*) Chromic oxide was prepared by using at sodium dichromate, sulphur and charcoal efficiency of conversion was found to be 95 per cent. (*ii*) Chromic anhydride obtained by the action of sulphuric acid on concentrated solution of sodium dichromate. Best yield obtained by the use of H_2SO_4 if Sp. qr. 1.750. (*iii*) Chrome alum obtained by passing current of sulphur dioxide into a saturated solution of potassium dichromate containing H_2SO_4 Efficiency of conversion was found 95 per cent.

3. M. G. Bhargava, with Dr. D. R Dhingra, Principal, and G. N. Gupta, Research Chemist., (*i*) Saccharine, For the award of the A.H.B.T.I. Diploma, Published in Indian Journal of Pharmacy Vol. 13, 1951, p. 83, Saccharine is a powerful sweetening agent, particularly useful when a sweet taste is desired without using a carbohydrate. It is prepared by treating toluene with chlorosulphonic acid to form toluene sulphonylchloride which is treated with Ammonia.

   The resulting sulphonamide is dissolved in caustic soda and oxidised with potassium permanganate. The solution so obtained is acidified with hydrochloric acid giving saccharine.

(*ii*) Potassium Permanganate, for the award of the A.H.B.T.I., Diploma, Published in Indian Journal of Pharmacy, Vol. 13, 1951, p. 106.

(*iii*) The Oil Spearmint, for the award of A. H. B. T. I., Diploma, begun in 1950, completed in 1951, Published in Soap, Perfumary and Cosmetics, London, March, 1952, p. 279, 1951, Spearmint oil is used for the flavouring of chewing gums, tooth pastes, confectionery, gums, etc., U.S.A. is main producer of spearmint oil. Spearmint comprises several varieties of Mentha Spicta and mentha viridesh. It is called Pudinah in Hindi.

4. D. R. Dhingra, Principal, with G. N. Gupta, Research Chemist, and Ganesh Chandra Research Assistant, The Vetiver oil industry with special reference to Prades, begun in 1951, completed in 1952, Published in Indian Soap Journal September, 1952. (The production of Khas is an important cottage industry of the State. The yield of vetier oil varives from locality to locality. The oil content of various samples of Khas roots collected from different localities has been determined. Samples of Khas oils from different centres of production, *e.g.*, Bharatpur Math, Musanagar, Biswan, etc., have been analysed.)

7. T. N. Ganjoo, with Dr. D. R. Dhingra, Principal, and G. N. Gupta, Research Chemist. Camphor and camphor oil from ocimum leaves, for the award of A.H.B.T.I., Diploma, begun in 1949, completed in 1950, Published in Indian Soap Jour. October, 1951, p. 85. (The leaves were distilled and a special box type of condenser was used to condense camphor. The distillate contains about 50—60 per cent. of camphor. The yield of the mixture of camphor and oil varies from 3—4 per cent. on dry basis. The oil has been separated from camphor by repeated cooling and its constitution studied.

8. J. N. Mehrotra, Guided: Dr. D. R. Dhingra, Principal, and G. N. Gupta, Reseach Chemist, Peppermint oil and the possibility of its prouction in Uttar Pradesh, Fo the award of the A.H.B.T.I., Diploma, begun in 1950, Completed in 1950. (Published in Indian Soap Journal Vol. 17, p. 43, August, 1951, India imports huge quantities of peppermint oil from U. S. A., Australia, Japan, etc. The oil is not prodced in India. Mint, plants have been cultivated on a semilarge scale and their oil extracted and chemically analysed. Economics of manufacture of peppermint oil are described in the paper.)

9. G. N. Gupta, Guide: Ganesh Chandra, Research Asstt., The oil of Cyperiol (Cyperus) Scarisus, begun in 1951, completed in 1951, Published in Current Science, October 1951, 20, 273. (The oil is obtained by distillation of the tubers of nagarmotha. The yield of oil is 0.31 per cent. on the weight of tubers. Its physicochemical constants have been determined. It has good fixative properties and can replace patchouli oil.

10. B. N. Gupta, Guide: Dr. D. R. Dhingra, Principal, and G. N. Gupta, Research Chemist., The Otto of Jasmin Auriculatum (Juhi), For the award of the A.H.B.T.I., Diploma, begun in 1950, completed in 1951, Published in Perfumery and Essential oil Record-Nov. 1951, Vol. 42, No. 11. (Its physico-chemical constants have been determined).

INDIAN AGRICULTURAL RESEARCH INSTITUTE

Horticulture

1. Dr. G. S. Randhawa, Lecturer, (*i*) Randhawa, G. S., Quince as a dwarfing rootstock for pear, Publised in Indian Journal of Horticulture p. 1—5, June 1950. (A review of literature on this topic which is likely to be very useful for the research workers.)

(*ii*) Randhawa, G. S. Degree of compatibility of rootstock and scion with particular reference to deciduous fruit trees, Published in Indian Journal of Horticulture p. 1—5, June, 1951. (A review of literature on this topic which is likely to be very useful for the research workers.)

(*iii*) Randhawa, G. S. Fruit Quality as affected by nutritional status of Kieffer pear trees, for Ph.D., begun in June, 1947, completed in April, 1949, Published in Indian Journal of Horticulture, 9 (2): 14—17, 1952. (It was concluded from these studies that Kieffer pear trees with low calcium and nitrogen contents bear fruits with low contents of total soilds and ascorbic acid. The calcium and nitrogen in the leaves seem to be necessary for the synthesis of ascorbic acid.)

2. Chatterjee, D. and G.S. Randhawa, Standardised names of cultivated plants in India :—I fruits, Published in Indian Journal of Horticulture, 9 (2)-24—36, 1952. (The correct botanical names of the cultivated fruit trees of India have been given along wih their common names, families origin, etc.)

Entomology

1. Dr. Sardar Singh, Lecturer, Insect pollinators, begun in 1951. (Collections of insect pollinators on various crops are being made and their modus operendi studied. A consideable time has been spent in bringing together the world literature on the subject.)

Plant Pathology

1. Dr. D. Suryanarayana, Lecturer in Mycology, Green ear disease of bajra caused by Sclerospora gramindicola in the vicinity of Delhi, begun in April, 1952, likely to be completed in 1954. (Oospores produced by the Pathogen have been germinated and successful artificial infection was secured by inoculating the host with them. Factors

that bring about the germination of Oospores and the infection they cause upon the host are under investigation.)

Agricultural Chemistry

1. Dr. W. V. B. Sundra Rao, Lecturer and Mr. S. P. Seth, Research Assistant, Indicator plant studies using Tomato as indicator plant, begun in November, 1951, completed in May, 1952, Paper sent for publication to Indian Science Congress Session. (Tomato as indicator plant was found to be useful in indicating. The major deficiency of nitrogen in the soil by visual deficiency symptoms. In Delhi soil the addition of nitrogenous fertilisers along with phosphatic fertilisers gave tomato fruit yield ten times over that of control. The percentage composition of nitrogen and phosphorus was also high when compared with the control.)

AERONAUTICAL ENGINEERING

Research Work

G.V. Ramana Rao, Ripple Tank.-The analogy between hydraulic jump and shock-wave is well known. A project, to extend this analogy to the two-dimensional motion of shock-wave, is taken up. A shallow water tank 23″×30″ with a plate-glass bottom is constructed. By using a 45° mirror, light is projected,through the bottom of the tank and falls on a ground-glass screen, held above the tank. Disturbances created on the surface of water thus cast shadows on the ground glass screen, which can be photographed. The main purpose of this project is to study the total internal reflection of a single wave and obtain information analogous to the reflection of a shock-wave at a boundary layer. Some preliminary experiments were made and the results are satisfactory. In this connection a spark-light source, of the order of 10 micro seconds duration, is being constructed.

Y. V. Gururajacharya and G. Janaki Ram, Propellers.—The distribution of circulation along the blades of propellers having six and eight blades was undertaken. The exact formulae involved the evaluation of Bessel functions, modified according to Watson, with values of the imaginary argument ranging from 0 to 40 and the order of the function going up to 12. These were calculated by the use of approximate infinite series suggested by Gray and Mathews. The charts of circulation distribution have been completed.

T. N. Krishnaswamy, (*i*) Open Circuit Wind Tunnel. In connection with the proposed 14′×9′ open circuit type wind tunnel, a model 1 : 12 of the tunnel with the ancillary equipment has been made. The layout of the wind tunnel structure has been subdivided into three major parts *viz.*, the Inlet Building, the Test Section and the Diffusor.

The Inlet Building consists of a 80′ × 20′ rectangular section converging in two stages to 20′ × 14′ within a short distance of about 45′. Arrangement is provided for necessary screens and honeycomb to be fixed at predetermined positions. It is also necessary that the 80′ span at the inlet should be free from any support in the middle and therefore a suitably designed building with 80′ span trusses covered by asbestos sheeting and with provision for a false ceiling to provide a smooth and continuous surface for the airflow has been cost extimated.

When the tunnel is running at the maximum design speed, the pressure in the test section and consequently in the building enclosing the test sections falls below the outside atmospheric pressure and this difference of pressure has been calculated to be 100 lb./sq. ft. Therefore, a suitable R.C.C. building of required dimensions, capable of withstanding an estimated load of 100 lb./sq. ft. acting all over, and with provision for an air lock door has been designed.

The diffusor consists of a single straight portion diverging from 14′ × 9′ to 36′ × 18′. Two fans of 18′ dia. directly driven by two 500 H. P. motors are located near the outlet. The diffusor has been designed as a R.C.C. shell supported at a short intervals on suitable footings. The transition from 14′× 9′ to two circles of 18′ dia. at the outlet has been made as gradual as possible to keep the airflow free from tendency to separate from the wall.

(*ii*) Fan Drive for the Model Wind Tunnel. A 1/12 scale model of the proposed wind tunnel has been completed for purposes of testing.

In this connection, the two fans and the necessary drive with arrangements for measuring the efficiency of the fans have been designed. The fans are identical and each 18″ in dia. It consists of a bronze hub 6″ in dia. with arrangements at the rim for mounting the required number of blades upto a maximum of 12 blades. The blades are of aluminium alloy and are fixed to the hub by means of lock nuts. The blades have been designed and the necessary templates and jig for checking have been fabricated. A specially designed motor drives the two fans by pulley drive and arrangement is provided to measure the input to the fan directly on the motor by a dynamometer type apparatus. The shaft of the fan is supported rigidly on a separate stand. A spinner on the hub and a fairing over the shaft complete the streamlining of the exposed parts.

C. V. Joga Rao, (*i*) Design of a Low Frequency Fatigue Testing Machine. Most of the fatigue testing machines available in the market are of the high frequency type. In aircraft most of the parts subjected to fatigue are subjected to fatigue of low frequency. Design of a fatigue testing machine suitable for low frequency fatigue testing is in progress.

(*ii*) Analogy for torsion in the Elasto-Plastic Range.

P. Srinivasa Row, Airplane Instruments. With the co-operation of Hindustan Aircraft Ltd., we have been able to obtain some of the instruments used in airplanes. A small-scale set-up of some of these basic instruments is being made as a preliminary to a complete Instruments Laboratory. The principles of operation, testing and callibration of altimeters, airspeed indicators, electrical thermometers—(resistance type and the thermo-electric type), pressure gauges, etc., will be clearly demonstrated. Remote indicating systems such as the autosyn and magnesyn types of instruments, and different types of compasses will also be demonstrated. Gyroscopic instruments such as the turn and bank indicator, directional gyro and the gyro-horizon will be arranged to operate so as to illustrate how the precessing gyroscope can be utilised to give a picture of the attitude of the plane during flight. The main object of this set-up is to serve as a supplement to the course of lectures on aircraft instruments.

Y. V. Gururajacharya and G. Janaki Ram, (*i*) Propellers, Based on the work done by Goldstein, Lock and Yeatman and the method developed by Tietjens, a series of handy design charts are being prepared for the layout of three and four-bladed propellers. The final charts will be worked out for waterscrews only as the experimental data necessary for aircrews are not yet available. The distribution of circulation around three and four-bladed propellers as given by Lock and Yeatman were used.

(*ii*) Hot Wire Anemometer. The turbulent mixing process, particularly in the boundary layer actually, may give us the explanation as to the velocity distribution, internal friction or separation in an adverse pressure gradient and similar problems. Turbulence measurements are not often carried out not because of their lack of importance but due to the paucity of instruments and techniques.

The simple kind of a hot wire anemometer consist of a tungsten wire kept normal to the wind, the wire forming an arm of a Wheatstone's bridge. The fluctuations of current are amplified and measured or recorded and can be used as a measure of the velocity changes.

A start has been made in the design of this instrument but the non-availability of the wire in the local market has caused some delay. Efforts are being made to get the required wire from industrial concerns.

K. Krishnamurthy, (*i*) Supersonic Wind Tunnel. It is proposed to set up a supersonic wind tunnel for investigating various compressible flow problems over a large range of Mach Numbers, say from 1.5 to 4.0. The tunnel will operate intermittently on the blow-down principle, *i.e.*, air from a high-pressure storage tank will be allowed to flow through the test section and then discharged into the atmosphere.

Calculations have been made to determine the tank volume necessary at different storage pressures to operate a tunnel over a March range of 1.5 to 4.0, the running time being 30 seconds. If air is stored initially at a pressure of 300 lb. per sq. in., a 500 cu. ft. tank is necessary to operate a tunnel of 0.25 sq. ft. working section for a Mach range from 1.0 to 3.5, and for a test run duration of 30 seconds. These figures represent the minimum requirements for the tunnel. With such an arrangement it is not possible to conduct tests at higher Reynolds numbers or for longer durations. With a given tunnel the best method of obtaining different Reynolds numbers at any Mach Number is to vary the stagnation pressure at the inlet to the tunnel for each test. This could be achieved only by increasing the volume of the pressure tank if the test run is not to be cut down below half-a-minute. Thus for higher Reynolds numbers and longer test periods a pressure storage tank twice or thrice the minimum will be required. The final choice, however, would be dictated by considerations of cost.

The storage capacity of an induction type tunnel at 300 lb./sq. in pressure running intermittently for operation over a Mach range from 0.4 to 1.4 with a test run of not less than one minute has been computed. If the equipment for such a tunnel, such as the pressure vessel and the compressor, is similar in size to that needed for the supersonic tunnel discussed above, an induction tunnel at a slightly additional cost, cam be added to the supersonic set up, to improve the tunnel facilities to conduct tests over a very wide range in high-speed aerodynamics. In the induction type tunnel, air at a high pressure is allowed to expand through an annular nozzle placed downstream of the working section thus inducing a flow of air from the atmosphere through the working section. If the blowing pressure of the inducing jet is maintained at 100 lb. per sq. in gauge compressed air at 300 lb. per sq. in will be stored in a tank of approximately 1,220 cu.ft. capacity, for a tunnel of 1 sq. foot. working section to be operated over a Mach range from 0.4 to 1.4, with a test duration of 60 seconds.

From these and estimated cost considerations for suitable compressors and dryers, it has been decided that a tank of 1,500 cu. ft. capacity will be set up. An air compressor delivering 340 cu. ft. of free air per minute at 300—350 p.s.i. gauge will charge the tank to a pressure of 300 p.s.i. gauge in about one and half hours. The compressor will pump air into the tank through commercial Lectrodyer which will dry the air to a final due point of minus 40 degrees.

(*ii*) Experimental Supersonic Tunnel. In order to study the design of Nozzle blocks and other pertinent problems that would arise in the fabrication of the big supersonic tunnel a small tunnel using a 8.5 H. P. compressor available in the Department is being constructed. The compressor delivers 30 cu. ft. of free air per minute at 100 lb. per sq. in. For frequent operation of such a tunnel the time for charging the pressure tank should not be more than about an hour. Taking a one hour re-charge time the tank volume should be 300 cu. ft. A tank of 300 cu. ft. capacity would be suitable to operate a tunnel of 3 sq. in. working section. Tests can be made for a Mach Number range from 1.0 to 3.0, the test duration being half a minutes. These calculations have been based on an inlet stagnation pressure which varies all through the period of tunnel operation. A tank of 5 feet dia. and 17 ft. 4 in. overall length has been ordered. The fabrication of the tunnel is on hand.

C. N. Lakshminarayana, Diaphragm-Type Manometer. The displacement of a plate relative to another fixed surface can be measured with extraordinary accuracy by the change in the capacitance between plates or the change in mutual inductance of two coils mounted on them. The displacement may be caused by the pressure difference between the to limbs of a manometer and a suitable electronic circuit may be utilized for indicating and recording the pressure changes. By this means a manometer for measuring the very small pressure differences can be built. This type of manometer will be extremely useful for measurement of steady or pulsating pressure differences since the inertia of the moving parts will be small and even very small displacements can easily be amplified and measured electronically. By choosing suitable diaphragms different ranges of pressure measurement can be obtained.

List of papers published

1. O. G. Tietjens, The Wind Tunnel, the basic Research Equipment in Aeronautical Engineering, Published in The Mechanical Engineeri 1951, No. 2.
2. P. Srinivasa Row, On the Physical Significance of Some Dimensionless Groups in the Theory of Heat Transfer, Published in (*Ibid.*)
3. C. L. Amba Rao, A Note on the Design of Columns Stressed Beyond the Yield Point, Published in (*Ibid.*)
4. P. Narasimha Murthy, Redundancy of a Structure, Published in (*Ibid.*)

Biochemistry

Food and Nutrition

R. Rajagopalan, T. A. Venkitasubramanian, H. Srikantiah and D. S. De, Investigations on Vegetable Milks. Under the joint auspices of the Defence Department, Government of India, and the Food Technology Laboratory of this Department, human feeding experiments were conducted at the Military Camp, Jalahalli, to evaluate the nutritive value of soyabean milk. The soyabean milk was prepared according to the modified technique developed in these Laboratories. Periodical observations on haemoglobin, height weight and general conditions of health were maintained for the two groups fed with soyabean milk and blended milk. Dietary survey was also made to assess the general nutritional status. The results have clearly indicated that the nutritional value of soya milk is comparable to that of the blended milk.

D. K. Nandi and S. S. De, A vegetable milk prepared from soyabean, groundnut and ragi malt extract, very similar in composition to cow's milk and which can be used as a milk substitute for infants, has been developed.

R. Rajagopalan, H. Srikantiah and S. S. De, Supplementary Value of Soya flour. In view of the high protein content of soyabean, attempts have been made to process the soyabean so as to obtain a flour which could be used as a supplement to wheat flour for making bread, biscuits, rusks and chappati. The debittered and processed flour is found to have a pleasant flavour and taste. The preparations made with soya flour supplement are generally found to be more tasty and there is a considerable increase in the nutritive value of the products.

B. M. Lal and S. S. De, Multi-Purpose Food (Utilisation of oil-seed cakes and tubers like tapioca and sweet potatoes, for the production of subsidiary or emergency foods like the Multi-purpose Food of U. S. A., has been investigated. Animal experiments have shown high supplementary value for this food.

Miss Vanamala Sathe, T. A. Venkitasubramanian and S. S. De, Rice, (The influence of fertilisers (organic and inorganic) on the vitamin content of rice, the effect of milling on the phytic acid content of rice, the effect of addition of phosphorus to the soil on the phytic acid phosphorus in rice grown on it and the different grades of milling on the utilisation of calcium and phosphorus in the diet have been studied. Effec of different grades of polishing on the utilisation of iron and on iron metabolism have been investigated.

T. A. Venkitasubramanian and S. S. Dey, Preparation of Vitamin Concentrates, Preparation of vitamin concentrates from carrots, lettuce and other cheap sources is being tried using the molecular still. · The efficiency of separation of vitamin A from shark liver oil by molecular distillation is also being investigated.

S. C. Balasubramanian, M. Ramachandran, T. Viswanath and S. S. De, Microbiological Assay of Amino Acids and Peptides of Nutritional Importance. Under the auspices of the Indian Council of Medical Research, investigations have been carried out for a standardisation of methods for the estimation of tryptophan, leucine, iso-leucine and valine using Lactobacillus arabinosus, and cystine, methionine, phenylalanine and histidine by means of Leuconostoe mesentercices PD-60 in rice, wheat, cholam, cambu and ragi. The estimation of threonine and arginnine is under progress.

T. Viswanath and S. S. De, Factors influencing the slow rate of liberation of methionine and lysine in soyabean which have got an important bearing on the nutritive value of protein are being worked out.

K. Krishnamurthy and S.S. De, Green gram, black gram, horse gram and soyabean have been tried for the presence of strepogenin which is present in crystalline protein-like trypsin. The globulin fraction was found to contain this activity and the factor was estimated microbiologically using L. casei. Animal experiments confirmed the analytical results.

S. Balakrishnan and S. S. De, Intestinal Synthesis of Vitamins, To study the effects of protein levels on the intestinal synthesis as well as the utilisation of thiamine, the faecal and urinary excretion of rats fed diffeent levels of proteins were studied at different levels of intake of vitamin B_1. 5 per cent. Protein level seemed to favour greater intestinal synthesis of vitamin B_1, than 15 per cent. and 25 per cent. levels while the utilisation of vitamin B_1 was greater at higher levels of protein.

M. Narayana Rao and S. S. De, Fatty Acids and Calcium Utilisation, (The nutritive value of different glycerude fractions of butterfat as compared to the whole fat as also the effect of the glyceride structure on calcium metabolism is being studied.

Antibiotics

P.L. Narasimha Rao and P. A. Kurup, (*i*) "Pterygospermin," Investigations have been continued on the purification, mode of action and chemistry of pterygospermin. Chromatographic method of purification. The kinetics of adsorption of the active material on various active charcoal preparations have been studied in detail. Although acid washed nor it is found to be a good adsorbent the elution of the product is not quite satisfactory.

(*ii*) Paper Chromatography, Using ascending method and *n*-butyl alcohol-water and coal bases (b.p. 120—30 °) as solvents, it is found that the antibiotic travels up a strip of Whatman filter-paper No. 1 and it can be easily detected as a dark grey spot by spraying a solution of ammoniacal silver nitrate and subsequent washing with sodium thiosulphate solution. The position of the antibiotic on the chromatogram is checked by running a parallel one and noting the inhibition of the growth of Micrococcus pyogenes var. aureus by placing the strip on a seeded agar plate and incubating for 18 hours at 37 °C. This method of testing the antibiotic fractions is considered to offer great advantages as it is quite simple and rapid.

(*iii*) Mode of Action, The effect of the antibiotic on the metabolism of M. pyogenes var. aureus and E. coli has been investigated. It is found that out of many amino acids and water-soluble vitamins tested, only thiamine and glutamic acid are able to inactivate the effect of the antibiotic, while curiously enough, pyridoxin shows synhergism.

(*iv*) Occurrence of Elemental Sulphur in Crude " Pterygospermin " Preparation, A few milligrams of a crystalline deposit from stored preparations (kept in ice-chest) has been identified as elementary sulphur. The separation of sulphur does not significantly affect the anti-bacterial properties of these preparations. It is believed that it is only a mechanical impurity and that it is probably formed by the oxidation of hydrogen sulphide that is found in the original alcoholic extract of the root in considerable quantities.

(*v*) Chemistry of Pterygospermin, (Highly purified preparations of the antibiotic are completely inactivated at room temperature at pH 9—13 in a few hours, with the formation of hydrogen sulphide, a neutral substance crystallizing in colourless hexagonal plates and containing sulphur and nitrogen (m.p. 146 °C.) and small quantities of basic products (a crystalline hydrochloride, m.p. > 230°C.). The antibiotic also reacts with an alcoholic solution of mercuric chloride resulting in the deposition of a micro-crystalline mercury derivative (R.HgCl, m.p. 148 °C.). A waxy crystalline matrix (mp. 90—115 °C.), which appears to be a diene steroid, is also obtained. Highly purified fractions of pterygospermin show characteristic absorption about 230—280 mμ.

(*vi*) Antifungal Properties of the antibiotic have been further studied. Experiments so far carried out appear to show that it is present in a free state in the roots and not in any bound form. Some fungi belonging to the genus of Rhizopus and Mucor have been isolated from the drumstick roots and they appear to be fairly resistant to the action of the antibiotic.

P. I. Narasimha Rao and S. Verma, (*i*) Morellin. It has been found that morellin, the pigment of Garcinia morella possesse a wide range of antebacterial activity. It is generally more active against Gram positive than Gram negative organisms. Due to its insolubility in aqueous solutions and instablity at pH higher than 7.2, various attempts have been made to obtain stable colloidal suspensions as well as soluble derivatives. A satisfactory soluble product has been obtained by reacting morellin with mono-chloro-acetic acid. The toxicity of morellin which appears to be due to the inefficient absorption and resulting necrosis at the site of injection, could be obviated by the use of its derivative.

Even the highly purified crystalline morellin preparations have been shown to be mixtures of four substances. A small quantity of waxy material (m.p. 68°) is easily removed by repeated cold extraction of well-purified morellin with petrol. This is quite inactive. The other three substances, *e.g.*, morellin-T, m.p. 80° $(a)_D^{24\cdot5} = -350$ (C = 0.4, chloroform) ; morellin-M, m.p. 156°, $(a)_D^{24\cdot5} = -524.13$ (C = 0.0725, chloroform) and morellin-L, m.p. 60° $(a)_D^{24\cdot5}$ — — 503.85 (C = 0.1945, chloroform) have been separated by careful chromatography of wax-free morellin, on a specially prepared silica-gel column. Morellin and its derivatives appear to simulate the antibiotic, usinic acid isolated from certain lichens.

(*ii*) Studies on Garlic Antibiotics. Due to its high toxicity, various new compounds resembling the allicin structure have been prepared and are now being tested. The inactivation of allicin by cystein is reproducible with glutathione which appears to take part in the mechanism of action of the antibiotic. From certain studies on the physical properties of diphenyl thiolsulphinate it appears that the two resonant structures of allicin are possible.

(*iii*) Antebacterial Properties of Plant Constituents. Some screening tests for antibacterial activity of some Indian essential oils, and their constituents have been carried out.

P. L. Narasimha Rao and P. A. Kurup, Antibacterial Activity of Fungi. A number of molds and fungi belonging to the genus of Aspergillus, Mucor, Rhizopus, Fusarium, Pencillium, etc., have been isolated and in pure culture screened for their antibacterial activity.

P. L. Narasimha Rao, Biosynthesis of Penicillin, (Various di-and tri-peptides have been prepared and the formation of penicillin by the organism as well as the conditions under which penicillin production takes place by the enzymes elaborated by the organism have been studied in detail.

Cytogenetics

B. Ranganathan and M. K. Subramaniam, Induction of Polyploid by Diverse Agencies. The discovery that tetrapolidy could be induced by treatment with acenaphthene in diploid yeast strains and the fact that tetraploids have an accelerated rate of growth and fermentation necessitated an extensive series of investigations. Physical and chemical agencies which have been known to induce a doubling of the chromosome complement in higher plants were tried on our control two-chromosome strain. Culturing in the ice-room produced genetic changes. Tetraploids, chromosomal translocation mutants and unmodified diploids were isolated. The similarity of the action of acenaphthene and thermal shocks suggested an extension of the investigations with camphor, colchticine and ultra-violet irradiation.

The treatment with colchicine and camphor was carried out simultaneously for a period of 35 days under conditions suitable for unlimited proliferation. Out of the four colonies picked out from plated material treated with colchicine, three were tetraploids and one a diploid. All the three colonies isolated after camphor treatment were tetraploids. It appears that gene mutations may occur before an actual duplication of the chromosome complement. The tetraploid colonies are highly stable and unlike in the case of the dilpoid, their expression is identical in Ragi as well as Barley malt agar. Tetraploid colonies isolated after ultra-violet irradiation are indistinguishable from those produced by chemical agencies.

Investigators on yeast have proceeded on the fundamental assumption that polyploid strains of yeasts do not exist. The induction as well as isolation of tetraploids by diverse agencies points to the fact that much of the published work on Yeast Genetics may have to be re-evaluated in the light of polyploid segregation.

S. Duraiswami and M. K. Subramaniam, Polyploidy and Gene Mutations. It was discovered that polyploidogens are also mutagens. The suspicion was therefore engendered that polyploidy does not consist in a mere duplication of the chromosome complement but involves primarily a gene mutation enabling such a doubled complement to function harmoniously. Reversal of gene mutations and an induction of tetraploidy were observed when the control two-chromosome brewery yeast was exposed to ultra-violet irradiation. In the context of the above observations it was apparent that induction of tetraploidy should be sporadic and that exposure to ultra-violet irradiation need not necessarily result in the production of tetraploids. Ultra-violet irradiation experiments were therefore carried out with the control strain to test the above possibility.

The Riboflavin Excreting Mutant by K. K. Mittra.

Sewage Purification and Sewage Farming

S.C. Pillai (*i*) On the Biological Oxidation of Sewage. In continuation of earlier studies on the importance of oxygen and the special significance of Vorticellids in the flocculation and oxidation of sewage in the activated sludge process, it was observed that aerobic conditions and oxidation changes were promoted in sewage filtered through soil, and the micro-organisms that developed during successive replacements of the soil filtrates (in shallow basins, by the fill-and-draw-method) were mainly aerobic bacterial, ciliate protozoa including peritrichous ciliates, *e.g.*, species of Epistylis and Opercularia and higher organisms such as species of Rotifers. Similar observations were made with 'weak' and ' diluted ' sewages as with soil filtrates, but the development of the colonial ciliates was slow in the former cases. All these types of organisms (including occasionally still higher organisms, *e.g.*, Aulophorus sp.) were found to develop rapidly in unfiltered sewage through the suspensions of which air was rubbled. In addition to these organisms, species of Carchesium were also noticed in certain activated sludges, *e.g.*, from the plant at Ambasamudram). Observations showed that, among the micro-organisms studied, the ciliates, more especially the colonial peritrichous ciliates, were the most efficient forms in producing effluents conforming to the Royal Commission Standards.

(*ii*) Fodder Crops Suited to Different Types of Soils Under

Sewage Irrigation. In continuation of earlier studies on crops and soils in relation to sewage irrigation, it was observed at the Madura Sewage Farm that elephant grass (Pennisetum purpureum), Guinea grass (Panicum maximum) and buffalo grass (Brachiaria mutica) were suited to gravelly soil. sandy loam, and clayey soils respectively.

Investigations on the Stability of Nitrogenous Fertilisers in Cotton Soils

S. Balasundaram, The studies on loss of ammonia from alkaline cotton soils were extended to two more fertilisers, groundnut cake and farm yard manure which lost 10 per cent-40 per cent. (as compared to 40 per cent-70 per cent. with ammonium sulphate) of added nitrogen in one week in alkaline cotton soils. This loss could be minimised by addition of straw or molasses. It was found that straw and molasses prevented ammonia loss from added ammonium sulphate in alkaline soils by (1) increasing the C/N ratio ; (2) by slight acid formation; (3) increasing adsorbent organic matter in soil and (4) by temporarily converting ammonium sulphate into bacterial protein which is immun to the chemical action o the alkaline soil.

The rate of nitrification of ammonium sulphate as affected by the additions of straw and molasses has also been studied.

The scheme is being worked under the auspices of the Indian Centra Cotton Committee.

Vitamins

K.S. Sreenivasan and B.N. Banerjee, Bio-synthesis of Vitamins in Molds, The synthesis of vitamin B_1 and vitamin C by certain strains of Aspergillus niger and Aspergillus flavus has been studied. Certain strains of Aspergillus niger which synthesise appreciable amount of vitamin C and certain strains of Aspergillus flavus and Aspergillus fumigattus which synthesise large amount of vitamin B_1, have been isolated.

Miss R. Saroja and K. V. Giri, Antithiamin Factor. The nature of the factors occurring in plants, which destroy vitamin B_1 is being investigated.

A. N. Radhakrishnan and K. V. Giri, Protective Factors for Vitamin C. in Plants. The isolation, purification and chemical nature o the factor, occurring in green gram which protects vitamin C from oxidation, have been investigated.

Enzymes

K. V. Giri, A. L. N. Prasad, J. Sri Ram and Miss Gowri Devi, Chromatographic, Studies of Enzymes. A new and simple technique has been developed for locating enzymes on paper. By means of this technique the movement of various enzymes on paper has been studied with a view to separate enzymes by paper chromatography. The essential feature of this method consists in the use of precipitating solvents such as aqueous acetone or aqueous alcohol and salt solutions as the moving phase and sheets of filter-paper as the inert support. The usefulness and potentialities of this technique in the study of the chromatographic behaviours of enzymes have been demon trated.

R^f values indicating the position of enzymes on paper for many of the enzymes, *viz.*, amylases, phosphorylases, and phosphatases have been determined.

Using this technique, enzymes have been separated from one another when they are present in a mixture. The various phosphatases of kidney, serum and plant tissues, amylases from tubers, cereals, liver and saliva, phosphorylases from green gram, etc., have been studied with respect to their chromatographic behaviour. A new classification of enzymes based on their chromatographic behaviour has been suggested. The technique should prove of value as a means of establishing the identity or diversity of renzymes, and in resolving other enzymes when occurring in mixtures, into their constituent parts.

J. Sri Ram and K. V. Giri, Phosphorylase, A systematic search for phosphorylase in various Indian pulses showed green gram (Phaseolus radiatus) to be a good source of this enzyme. The enzyme has been isolated and purified. The nature of the phosphorylase and its behaviour towards the various substances of biological importance have been studied. The chromatographic behaviour of the enzyme has also been investigated. A method has been developed for the preparation of Glucose-I-phosphate using green gram extract as source of phosphorylase.

D. Ramanarayan and K. V. Giri, (*i*) Phosphatases: Urinary Phosphatase. A method for the study of the excretion of phosphatase in urine, has been developed. The main feature of the method consists in subjecting urine to ultra-filtration under high pressure and determining the activity under optimum conditions. This will eliminate the effect of inhibitors present in the urine.

(*ii*) Green gram (Phaseolus radiatus), found to be a rich source of phosphatase. The enzyme has been purified and the influence of amino acids and vitamins on the activity of this enzyme has been studied.

C. S. Vaidyanathan and K. V. Giri, Arginase. The presence of arginase in the seeds of leguminous plants has been investigated and the seeds of Dolichos lablab were found to be a convenient source for the enzyme. The preparation and purification of the enzyme from the seeds and the influence of metallic salts have been investigated.

C. V. Ramakrishnan and B. N. Banerjee, Mold Lipases, Investigations have been carried out to isolate different species of molds of Penicillium, Aspergillus and Rhizopus genera grown on different oilseeds and the enzyme lipase has been extracted and the activity determined. Certain strains of Penicillium chrysogemum, Aspergillus chrysogenum, Aspergillus flavus, Aspergillus fumigatus and Aspergillus niger showed high lipolytic activity.

Research on the Treatment of Brackish-Waters and Fluorine Containing Water (Government of Madras)

K. Venkataramananan, N. Krishnaswamy and T. Ramakrishnan, The methods of preparation of the cation-exchange resin (for treatment of brackish-waters) were further studied and standardised so as to obtain a material of reproducible quality. The possibility of preparing anion-exchangers from groundnut meal and soyabean meal was studied without success. On the other hand, results of promise have been obtained with a material obtained by condensing the Avaram bark (tannin) extract with formalin in presence of excess ammonia. This finding is of considerable importance as it appears to offer a way out of the difficulty due to the non-availability of the usual raw material, (*viz.*, poly-amino compounds) in India.

The paddy husk carbon suggested by this Laboratory for use as an agent to remove fluorides from waters was further studied. It has been shown that the rather unique properties of this material are due to the depletion of silica during alkali digestion. The practical application of this method on a pilot plant scale in an endemic area is being made. The authorities of the M. & S.M. Railway have been contacted for facilities to instal a pilot plant to serve a part of the needs of the Railway Colony to Guntakal.

It has been shown that the capacity of this carbon for fluorine removal can be stepped up considerably (over six-fold) by simple modifications in the methods of preparation.

Fermentation Technology

The Council of Scientific and Industrial Research Schemes on (*a*) the National Collection of Type Culture, (*b*) the Industrial Enzymes and (*c*) the High Concentration alcohol in Distillery Works were continued during the year.

The Scheme on " The nutrition of the Silkworm " sponsored by the Government of Mysore was taken up during the year and results of some practical interest have been obtained.

Substantial progress has been made in (*a*) microbiological assay of vitamins and amino acids, (*b*) papyrography, (*c*) ultra micro-chemistry, (*d*) micro-manipulation and (*e*) cyto-chemistry.

LIST OF PAPERS PUBLISHED DURING 1950—51

1. K. V. Giri, (*i*) The Karyolytic Factor in the Serum of Rats Injected with Colchicine, Published in Journal Nature, 1950, 165, 1021.

   (*ii*) Distribution of the Protective Factor for Vitamin C. in Fractions of Liver Homogenates of the Rat, Published in (*Ibid*, 1950, 166, 441).

2. C. R. Krishna Murthy, Physico-Chemical Studies on Papaya and Indian Gooseberry Pectins, Published in (Proc. Ind. Acad. Sci., 1950, 32, 99).

3. S. A. Rahman and S. S. De, Effect of the Proteolytic Inhibitor on the Biological Values and Supplementary Values of Different Varieties of Soyabean, Published in Annl. of Biochem. and Exptl. Med., 1950, 10, 5.

4. K. Subramanyan, Miss Vanamala Sathe and S. S. De, The Hematopoetc Property of the Iron in Soyabean and Soyamilk and its Utilisanation in Normal Milk, Published in (*Ibid*, 1950, 10, 13).

5. H. S. R. Desikachar and S. S. De, The Tryptic Inhibitor and the Availability of Cystine and Methionine in Raw and Germinated Soyabean, Published in Biochemica et Biophysica Acta, 1950, 5, 285.

6. R. Rajagopalan, K. Subramanyan and S. S. De, Effect of Proteolytic Inhibitor on the Nutritive Value of Leguminous Proteins like Soya, Velvet and Nave Beans, Published in Journal Science and Culture, 1950, 15, 444.

7. S. M. Bose and V. Subrahamanyan, (*i*) Influence of Dietary Facts on Certain Constituents of Liver, Blood and Body of Albino-Rats with Special Reference to Fat Utilization, Published in Annl. of Biochen, and Expetl. Med., 1950, 10, 35.

(*ii*) Destruction of Vitamin A and Attendant Changes following the Absorption of Oxygen by Sharkliver Oil, Published in *Ibid.*, 1950, 10, 45.

8. T.A. Venkitasubramanian and B. N. Banerjee, Detection of Adulteration of Ghee (Butter Fat)-Linoleic Acid Content of Ghee, Published in Jour. Ind. Vet. Sci., 1945, 19, 301.

9. K. Ramamurthy and B. N. Banerjee, Studies on Indian Edible Oils—Cocoanut Oil, Published in Ind. Jour. Med. Res., 1950, 38, 49.

10. C. V. Ramakrishnan and B. N. Banerjee, Studies on Lipase from Oil-seed Cakes, Published in J. Ind. Chem. Soc., 1950, 27, No. 12.

11. C. V. Ramakrishnan, Enzyme Lipase, Published in journal Science and Culture, 1950, 16, 347.

12. C.V. Ramakrishnan and K.S. Sreenivasan, (*i*) Soil and Crop Production, Published in journal Fact, 1950, 5, 68.

(*ii*) Riboflavin, Published in journal Science and Culture, 1950, 16, 14.

(*iii*) Synthesis of Thiamine and Ascorbic Acid by Molds Grown on Cocoanut, Published in *Ibid.*, 1951, 16, 320.

(*iv*) Synthesis of Thiamine by Molds, Published in journal Research, 1951, 4, 142.

13. D. S. Venkatesh, M. R. Raghavendra Rao and M. Sreenivasaya, B_{12} Content of Moldy Bran and Brood Lac Extracts, Published in journal Curr. Sci., 1950, 19, 176.

14. T. N. Ramachandra Rao and V. S. Krishnamachar, Studies in the Fermentation of Carbohydrates, Part III, Published in Jour. of Sci. and Industrial Research, 1950.

15. T. N. Ramachandra Rao, Medicinal and Industrial Aspects of Fungi, Published in *Ibid.*, 1950.

16. V. S. Govindarajan and M. Sreenivasaya, A Papyrographic Study of the Non-Protein Nitrogen of Mangoes, Published in. Journal Curr. Sci., 1950, 19, 234.

17. V. S. Govindarajan, (*i*) A Papyrographic Method for the Determination of the Organic Acid Make-up of Fermented Beer,, Published in *Ibid.*, 1950, 19, 269.

    (*ii*) Microbiological Assays, Published in *Ibid.*, 1949, 18, 434.

18. S. C. Pillai, On the Biological Oxidation of Sewage, *Ibid.*, 1951, 20, 75.

19. S. Duraiswami and M. K. Subramaniam, Reversal of Some Chromosomal Mutations in Yeasts, Published in Journal Cellule, 1950, 53, 215.

20. M. K. Subramaniam and S.K. Sripathi Rao, Gene Mutations Induced by Camphor in Yeasts, Published in Journal Research, 1950, 3, 49.

21. M.K. Subramaniam, A Genetial Interpretation of the So-called Dauremodifikationen in Ciliates, Published in Journal Science and Culture, 1950, 16, 164.

22. S. N. Krishnamurthy and M. K. Subramaniam, Temperature as a Selective Factor for Yeast Mutants, Published in Journal Curr. Sci., 1951, 20, 17.

ELECTRICAL COMMUNICATION ENGINEERING

Work Completed During 1950-51

K. Sreenivasan, K. V. Seshadri and H. R. Bapuseetharam, Manual Apparatus for Ionosphere Measurements. The construction of the manually operated ionospere measuring apparatus mentioned in the last Annual Report has been completed. The apparatus runs off the a. c. mains supply and does not require any auxiliary supplies in the form of batteries, etc.

there are no moving parts and the apparatus is silent in operation. It covers at present the frequency range of 2.5 to 16.0 mcs.

The apparatus has been tested and works satisfactorily : on several occasions, 24-hour observations were made on the effective height and the critical penetration frequency of the F_2 layer. It would be desirable to extend the frequency range of the apparatus, down to 1.0 mc. on the lower side and up to 20 mc. on the higher side.

Mrs. L. H. Seshu and Mr. H. C. Basak, Selective Connection of a Large Number of Circuits to a Common Circuit. A brief description of this investigation was given in the last Annual Report; and a paper was published on it by Mr. H. C. Basak and Mrs. L. H. Seshu in Electrotechnics, March 1950, p. 8087. The work has been extended since then along the following lines :

(*a*) The selective connection of a group of individual circuits to a common circuit by " dialling " a single number : This is achieved with the help of an additional rotary switch A cross connected to the K relay selector B described in the paper referred to above.

The wipers of A perform the function of closing the key contacts associated with a number in the group, after which the switch A stops, and B starts to hunt for the K relay associated with this number in the manner already described. The closing of a K relay initiated the selection of the succeeding number by the switch A. This action proceeds until the last number in the group has been selected and its circuit switched through. The switch A moves to a free contact and halts there. The circuit is now free for the next group of numbers to be dialled.

Mrs. L. H. Seshu, Electronic Type of Static Ringing Convertor. A new type of electronic static ringing convertor was developed some time ago and found to work satisfactorily. An improvement in its efficiency has been achieved by certain changes in the design of the charging circuit. This consisted in a shunt feeding of the tuned circuit, instead of the original series feed.

Dr. B. S. Ramakrishna and Mr. V. R. Thiruvenkatachar, Combined Radial and Axial Heat Flow in Composite Cylinders. In the last Annual Report, it was mentioned that an investigation had been started into the problem of the temperature distribution in composite cylinders when there is both an axial and a radial heat flow. This question of combined axial and radial heat flow does not seem to have received attention till now.

The boundary value problem solved in this case is that of the distribution of temperature in composite coaxial cylinders under prescribed boundary and initial conditions. As the classical method of expansion of the intial temperature distribution in terms of the characteristic functions fails in this case, the solution has been obtained by the application of the Laplace transformation. The solution of the transcendental equation associated with the determination of the poles of the integrand in the inversion integral has been solved in a dimensionless form graphically. The temperature distribution at any instant is then obtained in the form of a doubly infinite series which converges rapidly and is suited for numerical calculation. A numerical example illustrating the procedure has been worked out and the temperature distribution at various cross-sections plotted. A paper on the investigation is ready for publication.

Investigation In Progress

K. Sreenivasan, T. K. G. Menon and K. K. Nair, Automatic Ionosphere Measuring Apparatus. For continuous observations on the ionosphere throughout the day and the year, the manual apparatus is hardly practicable. An automtaic recording equipment is essential, and work has been started to develop an apparatus similar to those developed by P. G. Sulzer in the U. S. A., T. L. Wadle in South Africa and L. Heisler in Australia.

V. Narayana Rao, The Pulse Testing of Networks. The construction of the pulse testing apparatus mentioned in the last Annual Report is now almost complete. Certain improvements have been incorporated to make the aparatus suitable for the study of the transient behaviour of wideband networks of the type mentioned by Espley, Cherry, and Levy in their paper " The Pulse Testing of Wideband Networks." (Journal I. E. E., Vol. 93, Part III A, 1946). The main improvement attempted here is in making the pulse duration as short as 0.05 microsecond.

The method that has been adopted to generate such short duration pulses is to use a delay line of suitable time delay in the anode circuit of pentode. The farther end of the delay line is shorted and the near end terminated with its characteristic impedance. When wide pulses or square waves of the desired repetition rate are applied to the grid of the pentode, narrow pulses of duration equal to twice the delay time of the line, will be obtained at the anode of the pentode. This output is suitably coupled to a cathode follower, at the output of which positive narrow pulses are available; and these are applied directly to the circuit under test. A " bootstrap " linear timebase generator supplies the timing wave form for the cathode-ray display. Negative pulses of 10—50 micro-seconds duration, suitably phased, are applied to this circuit, and linear time based waveforms of this duration and of an amplitude of 60 volts are obtained at the output. For insertion between the network under test and the display tube, a cathode follower probe and a special wideband amplifier are being developed. The apparatus has at present two fixed repetition rates, 3,000 per second and 10,000 per second. However, by applying sinusoidal waveforms from an external oscillator to the input of the first squ ring circuit, the repetition frequency of the pulses can be adjusted to any desired value. With such an arrangement for varying the repetition rate of the pulses, it will be possible to study the response of circuits to steady state pulses also.

H. C. Basak and Mrs. L. H. Seshu, Electronic Key Sender. The work on developing an electronic key sender is in progress, and an electronic impulsing circut for producing dialling impulses has been evolved. The impulse circuit is controlled by electronic switches which in turn are set by the keys of the key sender. Storage and selection circuits are required and these are being developed. A note on the impulse sender is due to be published shortly.

Dr. B. S. Ramakrishna and V. R. Thiruvenkatachar, (*i*) Acousties of Auditoria with Balconies. The new laboratory building now under construction for the Department of Electrical Communication Engineering of the Institute includes an auditorium with a balcony in it. The need thus arose or a theoretical study of the distribution of normal modes (that is, the frequencies of resonance) of a rectangular room with a balcony.

The effect of the balcony is being examined by two different methods ; (*a*) by considering the auditorium as being divided into two chambers, one above and the other below the balcony level, and subsequently matching the coefficients in the expressions for the distribution of sound pressure in the upper and lower chambers along the hypothetical surface (at the balcony level), over which the two chambers are connected except at the actual balcony ; and (*b*) by finding a suitable conformal transformation which would map the cross-section perpendicular to the balcony surface on a rectangle, and thus solving the wave equation in this transformed region. The work is in progress.

(*ii*) Acoustics of Sector or Fan-shaped Auditoria with Splayed Side Walls, This is a problem of considerable importance as the use of fan-shaped auditoria with splayed side walls is becoming more and more common. But the theory of the distribution of the normal modes even in the case of a fan-shaped auditorium without splayed walls has not been worked out. An attempt is being made to do this first by obtaining the solution of the wave equation for a fan-shaped auditorium with straight walls. When this is achieved, it is proposed to examine the effect of splaying the side walls by the application of the perturbation theory.

I. COMPLETED ITEMS

Experimental Work

N. T. Gopala Iyengar and A. V. Sreenath, Tests on Steyr Two-Cylinder Diesel Engine. This engine was sent to the Department by the Government of India (Directorate-General of Industries and Supplies, Development Division (Mechanical)), with the request that it may be subjected to performance tests with a view to ascertain the suitability for Indian conditions. Several performance tests were conducted and test reports with conclusions have been forwarded to the Government of India.

Development Work and Investigations

1. N. N. Narayana Rao, Spark Plugs. A comprehensive monograph on the principle and practice of the design, manufacture and use of spark plugs has been completed and an abstract was sent to the Indian Science Congress, 1951. Tests have been made on spark plugs which are being developed in the Government Porcelain Factory, Bangalore.

2. M. A. Thirunarayanan, (*i*) Resources of Low-Grade Coals in India, In view of the meagre resources of natural petroleum products in India, it was decided to investigate the availability and resources of low-grade coals in India, with a view to their utilisation, in pulverised form, in the field of internal combustion engineering, especially for Industrial gas turbines. This report indicates that no basic work has so far been done on the pulverisation of these fuels, and their utilisation in India. It is recommended that coals from all fields excepting a few, should be tried for pulverisation and their mode of combustion be studied before they are tried in combustion apparatus of any heat engines.

(*ii*) Possibilities of Coal Dust Engines, Investigations on the possibility of constructing engines to accept solid fuels, directly led to the study of various coal-dust engines, built successfully in the West.

In order to make understood their working and limitation, a report has been prepared on this subject.

This report indicates the desirability of removing first some of the principal difficulties of solid fuel injection, before embarking on this project.

3. K. Mahadevan, Utilisation of Vegetable Oils as Fuels and Lubricants, The Agricultural Departments of all the Provinces in India were approached for information regarding the availability of oil-bearing vegetable seeds in their respective provinces and a report has been prepared on the subject based on the data supplied by the various governments. The report indicates that oils extracted from the following seeds can replace mineral oils as diesel fuels in I.C. Engines, if their present production can be improved in quantity and lowered in cost: (*a*) Groundnut seeds, (*b*) Pongamia glabra (Karanj), (*c*) Azadirach indica (Neem), (*d*) Linseed and (*e*) Bassia longifolia (Mohwar-Illippai). The possibility of petrol being replaced by the only possible vegetable fuel, namely power alcohol, is dim, as the production of power alcohol comes up only to about 10 per cent, of the requirements of petrol and since pure alcohol is not suitable as a fuel for Internal Combustion Engines.

The data obtained so far are not sufficient to discuss the possibility of using vegetable oils as lubricants in internal combustion engines. It is, howeer, intended to carry out experiments with those vegetable oils where production now is considerable and may be extended comparatively quickly so as to know their suitability as fuels and lubricats in internal combustion engines and the additives required for their successful utilisation.

II. ITEMS UNDER ACTIVE PURSUANCE

1. M.R.K. Rao, (*i*) Tests on Cooper Horizontal Single Cylinder Engine (600 R.P.M., Messrs, Cooper Engineering Ltd., Satara Road, Poona, have sent to the Department one Horizontal single cylinder Diesel engine, to study the performance characterisics and to determine the wear properties of chrome hardened piston rings as against ordinary cast iron piston rings at a later stage.

The complete test set-up has been intalled on firm foundations suitable for endurance tests. Preliminary running has been conducted and further work is in progress.

(*ii*) Tests on High Speed Cooper Horizontal Single Cylinder

Engine (1,000 R. P. M.). The engine in its present form has a pre-combustion chamber and the object of the investigation is to design and develop an open type of combustion chamber suitable for direct injection of fuel. A 24 H. P.-D. C. generator has been converted into a dynamometer with suitable control devices. The engine has been installed on firm foundations and preliminary running of the unit has been done. Further work is in progress.

2. M. R. K. Rao and K. Narayanaswamy, Tests on Kirloskar-Petter High Speed Vertical Diesel Engine. Difficulties have been experienced in the couplings between engine and pump and this matter is being investigated in the Department. Mathematical calculations of the vibration characteristics of the unit has been undertaken which has not yet been completed.

3. M. R. K. Rao, N. N. Narayana Rao and K. Mahadevan. The main investigation on this engine however, is to study the possibilities of running it on light diesel oil instead of high speed diesel oil which is being recommended at present. An experimental set-up comprising an electric dynamometer (a compound D. C. generator was converted into a dynamometer a fuel panel board, and a power panel board have been completed. A preliminary running of the engine on high speed oil was undertaken and a report has been sent to the manufacturers. Further work is in progress.

4. K. Narayanaswamy, Pumpless Injection of Fuel in Diesel Engines, An Australian QBM 2-stroke Diesel Engine (4 H.P.) has been chosen for experimental work. A cylinder head with a suitably designed combustion chamber which shall utilise the differential pressure existing between the main combustion space and the pre-combustion chamber to force a jet of fuel into these spaces has been constructed. Construction work regarding several types of nozzles is nearing completion.

5. H.G.S. Reddy, (*i*) Fuel Injection in Petrol Engines. The performance of the engine selected (J. A. P. air-cooled 250 c.c. 4-cycle petrol engine) was determined when adopting a variable mixture carburettor. A special test rig was fabricated in the Department with the available diesel fuel injection pumps and injectors, and a study of the atomisation of petrol was made with this apparatus with the help of stroboscopic method, with respect to various cam rates, injectors and injection pressures. The results of the set-up was helpful in the process of selecting the best possible injection settings on the engine.

Satisfactory results have been obtained with the present set-up: better fuel consumption can be obtained with injection. The engine ran even on lean mixtures. According to the information available this is the smallest engine ever to have run on petrol fuel injection. Further work is in progress.

6. H. A. Havemann and M. R. K. Rao, U-Type Two-Stroke Petrol Engine with Low Pressure Petrol Injection. The injection of petrol into a two-stroke engine promises considerable improveent in fuel economy and has been accomplished by high pressure injection equipment, which is costly. The purpose of the present investigation is to develop a suitable low pressure injection system for a U-type petrol engine. This type has two parallel cylinders, with common combustion chamber, the pistons moving with a variable phase difference.

Preliminary theoretical studies have been completed and a spray chamber is under construction for studying the characteristics of low pressure sprays. Designs are in progress as regards a model of a U-type engine for studying the flow pattern of the scavenging air. Depending on the success of the results, a single cylinder engine will be built. The engine will also be provided with a novel system for scavenging and cooling.

7. M. R. Raghavan, U-Type Two-Stroke Diesel Engine. Certain aspects of a 'U' type two-stroke diesel engine, having two parallel cylinders and a common combustion chamber in one unit, have been theoretically investigated. In the light of these investigations, the design of a 'U' type crankcase scavenged two-stroke Diesel experimental unit, having the following dimensions has been taken up:

Bore: 90 mm.	Stroke (120+120) mm.
R.P.M.: 600	Crankcase scavenged.

Power 8 H.P. at rated speed, 600 R.P.M.

The engine is being so designed that with very few alterations, it can be converted into a blower scavenged 'μ' type two--stroke diesel engine.

The preliminary design of the above engine has been completed. The problem of finalising the design and the manufacture of the engine will be tackled during the coming year, *i.e.*, 1951-52.

8. S. Krishnamurthy, Mobile Producer Gas Plants. A test bed for the testing of producer gas plants has been constructed. A 6-cylinder Chevrolet

engine has been installed and a 50-H.P. dynamometer has been coupled to it, to measure the power output, while the engine is running on producer gas. The same dynamometer is being used as a motor for driving the engine if used as a suction unit, to enable the study of the characteristics of fuel beds, such as pressure loss, etc., under varying conditions of flow. It is proposed to work the whole plant at elevated pressures by the use of suitable centrifugal blowers. Further work in this connection is proceeding.

9. A Natarajan, Utilisation of Heavy Fuels in High Speed Diesel Engines. To obtained proper atomisation of heavy liquid fuels two methods are adopted : (*a*) preheating the fuel and (*b*) blending it with light fuels in suitable ratios. The subsequent effects, primarily the combustion in the engine and secondary effects, such as possibly corrosion, are being studied.

The test rig for the experimental single cylinder high speed diesel engine has been completed.

10. M. A. Thirunarayanan, Development of an Injection Device for Injecting Pulverised Fuel into Pressurised Chambers. In view of the abundant supply of low-grade coals in India, work was initiated regarding the efficient utilisation of these fuels. It was decided to develop a suitable device for the continuous injection of pulverised fuel into pressurised combustion or gasification chambers, so that they could be adopted for Gas Turbines later on.

An injection apparatus in the form of an air-ejector, based on orthodox design principles was manufactured, and from this, a new and original design has been evolved which is in the process of falrication. The new ejector is expected to overcome a back-pressure of as high as three to four atmospheres.

11. K. Mahadevan, Gasification of Pulverised Fuel : Cyclone Gas Producer. An investigation by Havemann has indicated that a cyclone chamber has special advantages as a combustion chamber to burn heavy liquid fuels and pulverised solid fuels. With certain modifications, a cyclone chamber can be adopted for the gasification of heavy liquid fuels and pulverised solid fuels, with possible gain in efficiency and bulk as compared to orthodox methods. Designs for an experimental set-up for the above investigation are being prepared in the Department, for using heavy liquid fuels in the first instance.

12. A. V. Sreenath, (*i*) Improvement of Power Output of Automobile

Engines on Producer Gas. A report on the subject was submitted to the Indian Science Congress (1951). The results have indicated that the best method to increase the power output of a petrol engine running on producer gas, with minimum alterations, is to increase the compression ratio by making changes either in the cylinder head or to pistons. It has been decided to conduct experiments on these lines, and a Chevrolet six-cylinder truck type of engine has been selected for tests. A gas plant manufactured in India is being erected for the producer gas fuel. Further work is in progress.

(*ii*) Blower Scavenged Two-stroke Engines. Theoretical investigations indicate that the performance of a uniflow blower scavenged two-stroke diesel engine at different speeds will be better at low speeds, when the blower is run at constant speed since high torque can then be obtained. A General Motor's two-stroke diesel engine with Roots blower has been bought and preliminary tests, are in progress.

13. M. R. K. Rao and N. N. Narayana Rao, Testing of Filters. In March 1951, Messrs. Kirloskar Bros., Ltd., had sent two filters. An experimental set-up is being built with the object of comparing the separating efficiency and pressure drop for the two filters.

14. H. A. Havemann and N. N. Narayana Rao, Hot Air Engines Scheme. Under the auspices of the Council of Scientific and Industrial Research a scheme has been undertaken as follows: The heat engine uses air as the working medium to which heat is added from hot combustion gases through a heat exchanger externally. Calculations have been made to determine the thermodynamic properties and the performance of the cycle, and especially to find out the most suitable design of the tubular heat exchanger. The results were encouraging and have been incorporated in a paper, an abstract of which has been sent to the Indian Science Congress, 1951. Efforts are now being made to obtain or build the necessary components and test equipment and to evolve the detail designs, for which the theoretical work had to be greatly extended.

15. M. R. K. Rao, Study of Indigenous Metals and Alloys for Parts of Internal Combustion Engines. The object of this investigation is to produce engine components such as crank-shafts, cam-shafts, valves, pistons, etc., from local materials, with the view to, later on, manufacture an engine unit completely from indigenous materials.

For this purpose the following materials were supplied by the Mysore

Iron and Steel Works, Bhadravati: for crankshafts and camshafts: cast iron, cast steel ; and forged steel, for gear blanks : cast iron and steel forgings; and for valves : steel forgings.

These materials have been sent to the Department of Metallurgy to study the physical and chemical properties and recommend the right type of heat treatment that will result in maximum strength and resistance to wear. Further work will be taken up on receipt of this information.

16. R.G. N rayan Murthy, Design and Development of a 150 B.H.P., Six-cylinder, In-line Inverted, Air-cooled, Otto-Engine with Fuel Injection for Aircraft Propulsion. Consistent with ideas sponsored jointly by Dr. Havemann, and Dr. Ghatage, Chief Designer, Hindustan Aircraft, Ltd., and with the co-operation extended by Dr. Kothari, Scientific Adviser, Ministry of Defence, Government of India, the above project has been initiated and it has been in progress since May 1950. The work is being done by the Scientific Officer, deputed by the Defence Science Organisation, Ministry of Defence, under the guidance of Dr. Havemann.

The project is split into two broad phases, *viz.* :

(*a*) Design, fabrication and development of a single cylinder engine of 25—30 B.H.P.

(*b*) Adaptation of the single cylinder to a six-cylinder version of 150 B.H.P.

The first phase has been taken up. Designs and type drawings of most of the major components are nearing completion but for the finalisation and design of minor parts.

In general the design has presented numerous unusual problems since many of the recent developments conducive to efficient performance have been incorporated, *viz.*,

The best positioning of valves, sparking plugs in the spherical dome of the combustion chamber.

Direct fuel injection and locating the injector at the apex of the spherical dome, etc.

The progress has been impaired due to lack of sufficient staff.

17. N.T. Gopala Iyengar and K. Narayanaswamy, (*i*) Installation and Tests, on Derwent Mark V Jet Propulsion Unit. The necessary building changes for the installation of the Derwent Jet Propulsion Unit are being completed. Fabrication of instrument panels, jet pipe, deflectors and other structural work is in progress. The installation of the unit is expected to be completed within a short time after the arrival of the necessary control instruments and other equipment on order with foreign firms.

(*ii*) Design of 250 H. P. Gas Turbine Unit. Calculations and design work on gas turbine unit of 250 H. P. output are proceeding. In this connection, the Head of the Department visited the Mysore Iron and Steel Works, Bhadravati, to acquaint himself with the facilities available there for the production and processing of materials suitable for gas turbine construction.

Though the emphasis of the work of the Department at present is still on Applied Research and Development, some subjects have been taken up, which have no immediate applicability.

18. H. A. Havemann and P. Srinivasan, Detonative Combustion of Oxygen Fuel Mixtures. The influence of turbulence on the rate of detonative combustion of propane-oxygen mixtures has been investigated previously by Havemann. In order to extend the work to regions of weaker mixtures, a combustion tube has been prepared. The work contemplated for different ratios of length : diameter of the tube has been completed for one l/d ratio, and so far the results indicate that turbulence has some influence on the weak side of the mixture. Work is progressing at present with a tube of a larger l/d ratio, and at the same time, instrumentation is being planned to measure the flame velocity and its distribution in the tube. Preparatory work is also in progress in regard to the effect of gas oscillations on the_flame propagation velocity.

19. K. Mahadevan, Design of Heat Exchangers. With the latest available knowledge on heat transfer and fluid flow, work is at present undertaken to formulate the basic principles for satisfactory design of regenerators and recuperators. The possibilites of adopting laminar flow for heat exchangers will be considered on the basis of surface area, pressure loss, space considerations, etc. A preliminary study on the subject is being conducted at present and will find application to the design of experimental as turbine and possibly the Hot Air Engine.

List of Publications in 1951

1. H. A. Havemann, Gas Turbines Modern Developments, Published in Engg. and Metallurgy Section, dated 3rd January 1951.

2. K. Mahadevan, Hot Air Engines: Published in Engg .and Metallurgy Section, dated 4th January 1951.

Published during 1949-50

3. Prof. H.A. Havemann, "Critical Cooling," Published in Mechanical Engineering Society Journal.

4. H. A. Havemann and M. R. K. Rao, "Diesel Engine Production in India," Published in Power and Production.

5. K. Mahadevan, "Basic Principles of Mass Production," Published in Journal of the Association of Principals of Technical Institutions in India.

For Restricted Circulation

6. A. V. Sreenath, and N. T. Gopala Iyengar, Test Report on Isotta Fraschini Diesel Tractor Engine.

7. M. R. K. Rao, Progress Report on the Kirloskar Petter Engine and pump Set.

8. A. V. Sreenath and N. T. Gopala Iyengar, Test Report on Cooper Horizontal Engine Type R.C.B. No. 2629.

9. N. N. Narayana Rao, Test Report on Kirloskar Petter Oil Engine Type A. V.I. Mark II (Progress Report).

10. A. V. Sreenath and N. T. Gopala Iyengar, Test Report on Steyr Diesel Engine Type W.D. 213 M NrST 066.

11. K. Mahadevan, Availability of Indigenous Vegetable Oils for Internal Combustion Engines in India.

12. N. N. Narayana Rao, The Spark Plug.

13. M. A. Thirunarayanan, Resources of Low Grade Coals in India.

14. M. A. Thirunarayanan, Coal Dust Engines.

15. Dr. H. A. Havemann, Deputation Report.

16. Dr. H. A. Havemann, Suggestion Regarding Faculty of Mechanical Engineering in the Proposed Science Academy.

17. Dr. H. A. Havemann, Outline Plan for the National Internal Combustion Engines Research Laboratory.

18. Dr. H.A. Havemann, Report of the Work Undertaken in the I.C.E. Department on Gas Turbines, to I.C.E.R. Committee.

19. Dr. H.A. Havemann, Memorandum on the Development of the Department of Internal Combustion Engineering for the Next 5 Years.

The following provisional Patent Application have been submitted and forwarded to the Patent Office, Calcutta.

20. Prof. H. A. Havemann, Improvements in or relating to Heat Transfer Devices.

21. Prof. H. A. Havemann, Improvements in and relating to Gas Turbine Power Plant.

22. Prof. H. A. Havemann, Improvements in and relating to Gas Producer Plant.

23. Prof. H. A. Havemann and N. N. Narayana Rao, Improvements in or relating to Cyclone Separating Devices.

24. Prof. H.A. Havemann, Improvements in and relating to Thermal Power Plant.

METALLURGY

1. E. G. Ramachandran and K. V. Chinnappa, Stresses on Electrodeposition.

2. N. R. Srinivasan and K. Venugopal, (Studies on rare metals, initiated last year, were continued. Investigations have been conducted on the niobates of the heavier metals with reference to their mode of formation, properties and constitution. A new lead niobate has been isolated. The new compound has two hydrates, *viz.*, $PbO. Nb_2O5. 5 H_2O$ and $PbO. Nb_2O_5. 10 H_2O$. Tests indicate different degrees of dehydration under controlled temperature and vacuum.

The tartrato complexes of niobium with other metals have been the subject of special study. The conditions of formation of a tartratoniobate complex of zinc have been investigated in detail. A new zinc complex has been isolated.

3. E. G. Ramachandran, B. Ramaswami and M. V. Patankar, Solidification Characteristics of Aluminium in Horizontal Moulds. Aluminium ingots have been cast in horizontal green sand moulds, employing various degrees of superheat. The rate of cooling in the mould has been varied by suitable disposition of aluminium and mild steel chill plates of varying thickness near the top or bottom mould faces. The crystal structure and segregation features in the ingots have been studied. Pour-out tests have also been carried out to determine the rate of cooling under specific cooling conditions.

4. J. Balachandra and T. R. Anantharaman, Electrodeposition of Metals from Fluoborate Baths. Further work has been carried out on the electrodeposition of metals from fluoborate baths with the object of determining their efficacy as compared with the cyanide or sulphate baths. Deposition of zinc, cadmium and silver from fluoborate solutions has been studied and the influence of several variables, *viz.*, metal content, pH, temperature, agitation and current density on (*a*) anodic and cathodic polarization, (*b*) on the nature and structure of the deposits and (*c*) on cathodic and anodic efficiency, has been examined. The relationship between marcostructure and microstructure of deposits has also been investigated.

The new research programmes on which work is proceeding are given below:

5. E. G. Ramachandran and V. R. Subramanian, Measurement of the Elastic Modulus of Metals. An apparatus has been set up for measurement of the elastic modulus of metals and is based on the principle of exciting oscillations in an accurately machined rod of the material under test. The frequency of the fundamental mode of oscillations is then directly determined by an oscilloscope and the modulus calculated therefrom.

6. J. Balachandra and Anand Mohan, Electrodeposition of Tin and Copper-Tin Alloys from Fluoborate Baths. The deposition of tin and copper-tin alloys from fluoborate baths is being studied in detail with respect to the influence of variables on the nature of the deposits and efficiency of deposition.

7. M. S. Thacker, Brahm Prakash and E. G. Ramachandran, Development of Aluminium Alloys for Substituting Copper in Electrical Machinery. This research programme is under the joint sponsorship of the Power Engineering and Electrical Technology Department and the Department

of Metallurgy. Preliminary work has been carried out and a design has been developed for the production of sound aluminimum ingots.

8. Brahm Prakash and R. Mallikarjunan, Separation of Zirconium from Hafnium. The zircon deposits of Indian contain appreciable amounts of hafnium and their separation from each other is an important industrial problem. A scheme for effecting this separation based on the principles of base exchange and of differences in vapour pressure and solubility of zirconium and hafnium salts, is under study.

9. E. G. Ramachandan, The Preparation of Aluminium by the Electrolysis of Anhydrous Aluminium Chloride. The Council of Scientific and Industrial Research, New Delhi, has recently sanctioned funds for the investigation of this scheme.

List of Publications

1. E. G. Ramachandran and K. V. Chinnappa, Determination of Stress on Electrodeposition by Using Electrical Strain Gauges, Published in The Societe Francaise de Metallurgie, LeChatelier Centenary Commemorations, 1950, Trans. Indian Institute of Metals, 1951.
2. E. G. Ramachandran and M.V. Patnakar, Hard Metal Carbides, Published in The Mechanical Engineer, Indian Institute of Science, Bangalore, 1950.
3. E.G. Ramachandran, A Note on the Mounting of Tungsten Wire for Microscopic Examination. Contributed to the Indian Science Congress, Engineering and Metallurgy Section, Bangalore Session, 1951.
4. E.G. Ramachandran, Electron Microscope and Metallurgy, Published in Metal Market Review, 3rd Ann. Number, 1951.
5. N. R. Srinivasan, Part III, Studies on Niobium and Tantalum, Published in Proc. Ind. Acad. Sci., 1950, 31 A. 381.
6. N. R. Srinivasan, New Salts of Niobium, Published in Proc. Ind. Sci. Cong., 1951, Sec. 4.
7. N. R. Srinivasan, Zirconium for Fractional Weights, Published in Curr. Sci., 1950, 19, 338.
8. N. R. Srinivasan, World-wide Quest for Uranium, Published in *Ibid.*, 1951, 20. No. 1.

Department of Physics

1. Raman Effect, Investigasion on the Raman spectra of crystals employing the powerful ultra-violet technique continued to be one of the major activities of the Department during the period under review. The Raman spectra of single crystals of barium chlorate and potassium chlorate. C. Shanta Kumari, sodiam ammonium tartrate (V. M. Padmanabhan), rutile (P.S. Narayanan) and cadium tungstate (V. Chandrasekharan) have been recorded for the first time. Several interesting new features have been observed.

An important investigation on the intensities of the Raman lines of diamond has been carried out by R. S. Krishnan and P. S. Nar..yanan. By means of accurate microphotometry using a Spekker photometer, they obtained the ratios of intensities of the Stokes and anti-Stokes due to the fundamental oscillation (1332 cm.$^{-1}$) of diamond as 426 and the ratio of the fundamental to the octave as 270. The dependence of the intensity of the Raman line on the fourth power of frequency was thus confirmed. Using the same technique, Narayanan has measured the ratios of Stokes and anti-Stokes lines for the intense high frequency Raman lines in calcite, gypsum and barite, again confirming the fourth power law.

Studies on the influence of temperature on the Raman spectra of crystals have been continued by C. Shanta Kumari during the period under review. The temperature variation in position and width of the prominent lines of potassium chlorate has been investigated over a wide range of temperature from 90°K. to 600°K. The value of the proportional change is found to be different for different Raman lines and is higher at higher temperatures. Contrary to Madan's supposition, no change in the crystal symmetry of $KClO_3$ is noticed throughout the temperature range investigated.

Effect of crystal orientation on the Raman spectrum of a single crystal of anhydrite has been investigated by R. S. Krishnan and C. Shanta Kumari using the ultra-violet excitation. They recorded eight lattice line in addition to the nine lines due to the sulphate ion. From the observed variations in intensity with orientation, tentative assignments have been given to the lattice lines.

The vibration spectrum of Rutile has been studied by group theoretical methods by P.S. Narayanan and more rigorously by B. Dayal. It has been shown that the structure possesses eleven frequencies, four of which are active in the Raman effect, six in the infra-red and one is inactive in both. The numerical values of the frequencies have been worked out on the basis of four empirically assumed force constants. It is found that there is a fair agreement between the observed values of the infra-red reflection maxima and the calculated values. The observed and calculated values of the compressibility also agree well.

2. Thermal Scattering of Light in Crystals. A few years ago, R. S. Krishnan pointed out that excitation by the intense resonance radiations of mercury, namely $\lambda 2537$, from a water-cooled magnet controlled mercury arc, which had been yielding very fruitful results in the study of the Raman spectra of crystals, could be profitably used in conjunction with a prism spectrograph of sufficient dispersion to study the Doppler shifted components arising from the thermal scattering of light in crystals. This opened up a new field of research which has been actively pursued in this Department. Detailed studies made by R. S. Krishnan on diamond and by R. S. Krishnan and V. Chandrasekharan on quartz have already been mentioned in the earlier reports.

During the year under review, V. Chandrasekharan has continued the investigations with many more crystals including diamond and calcite. The scattered spectrum of diamond obtained with ultra-violet excitation and a three metre spectrograph exhibits two pairs of Doppler shifted components clearly resolved, *viz.*, the longitudinal and two transverse components. He has measured the frequency shifts for different orientations of the diamond. These do not agree very well with the calculations from the elastic constants.

3. Thermo-and Piezo-Optic Properties of Crystals. Continuing his studies on the temperature variation of refractive index of crystals. T. Radhakrishnan has made measurements for a range of wavelengths (from 2,500 to 6,000 A) and from room temperature to 300°C. on LiF, CaF_2, MgO, SiO_2, and $BaSO_4$ (only in the visible region). The values have been utilised, in conjunction with dispersion formulae obtained by the author, to calculate the thermal dependence of the ultra-violet frequencies, using Ramachandran's theory.

In view of a discrepancy in his earlier results, G. N. Ramachandran has redetermined the photoelastic constants of diamond. Together with V. Chandrasekharan, he has also measured the photo-elastic constants of sodium choorate, a crystal belonging to the T class of the cubic system. Because the crystal exhibits natural optical activity without birefringence, new techniques had to be developed for the measurements. The data obtained show that q_{12} is not equal to q_{13} as, is required by Bhagavantam's theory.

4. Nuclear Magnetic Resonnace, G. Suryan, has developed a technique based on the principle of the magnetic recording of sound, whereby the signals to noise ratio can be appreciably increased in obtaining nuclear magnetic resonance signals. In additio to giving good discrimination from noise, the method also gives a fair idea of the shape of the resonance signal. Suryan has also studied nuclear resonance in flowing liquids and in this way demonstrated the effects of finite relaxation times and also measured their values.

5. Miscellaneous, From studies on Faraday effect of solutions containing lead nitrate and alkali nitrates of varying composition, B. K. Narasimha Murthy found that the magneto-optic anomaly was appreciably lowered at concentrations corresponding to the formation of complexes as was to be expected. V. S. Venkatasubramanian measured the ultrasonic velocity in such solutions of lead nitrate and alkali nitrate and found that the compressibility also showed abnormal changes at such concentrations corresponding to the formation of complexes.

Ahalya Radhakrishnan and G .N. Ramachandran have determined the unit cell and space group of sodium tartarate, $Na_2\ C_4 H_6 O_4, 2\ H_2O$.

The investigations on Raman Effect and the Scattering of light in crystals, the photo-elastic properties of crystals, refractive index, nuclear magnetic resonance and on the radioactivity of Indian rocks are being continued.

List of Publications

1. C. Shanta Kumari, Raman Specturm of Crystalline Barium Chlorate, Published in Jour. Curr. Sci., July 1950, 19, 204.

2. B. Dayal, Isothermals of Rock-salt from its Thermal Expansion, Published in Journal of Chemical Phsyics, 1950, 18, 1302.

3. G. Suyran, A new Method of Integration of Weak Nuclear Magnetic Resonance Signals, Published in Physical Review, 1950, 80, 119.

4. B. K. Narasimha Murthy, Formation of Complex Compounds between Lead Nitrate and Alkali Nitrates, Published in Jour. Curr. Sci., 1950, 19, 240.

5. Dr. R.S. Krishnan and C. Shanta Kumari, Raman Spectrum of Anhydrite, Published in Proc. Ind. Acad. Sci., 1950, 32,105.

6. V. M. Padmanabhan, Raman Specturm of Crystalline Tartrates, Part IV. Sodium Ammonium Tartrate, Published in *Ibid.*, 1950, 32,184.

7. C. Shanta Kumari, Raman Specturm of Potassium Chlorate and its Temperature Variation, Published in *Ibid.*, 1950, 32, 177.

8. K. Vedam, A Note on the New Method of Measuring the Elastic Constans of Solids, Published in Jour. Curr. Sci., 1950, 19, 205.

9. P. S. Narayanan, Raman Spectrum of Rutile (TiO_2), Published in Proc. Ind. Acad.Sci., 1950, 32A, 279.

10. S. S. Sharma, Thermal Expansion of Crystals; IV :—AgCl, LiF and MgO, Published in *Ibid.*, 1950, 32, 268.

11. Dr. G. N. Ramachandran, Photoelasticity of Diamond, Published in *Ibid.*, 1950, 32, 171.

12. B. Dayal, Vibration Spectrum of Rutile, Published in *Ibid.*, 1950, 32, 304.

13. V. Chandrasekharan, Raman Spectrum of Cadmium Tungstate, Published in Curr. Sci., 1950, 19, 277.

14. R. V. G. Sundara Rao, Elastic Constants of Orthorhombic Sulphur, Published in Proc. Ind. Acad. Sci., 1950, 32,275.

15. S. S. Sharma, Thermal Expansion of Crystals,—Part V. Haematite, Published in *Ibid.*, 1950, 32, 285.

16. Dr. R. S. Krishnan and P. S. Narayanan, Intensity Ratio of the Raman Lines in Diamond, Published in *Ibid.*, 1950, 32,379.

17. V. Chandrasekharan, Thermal Scattering of Light in Crystals,—Part II. Diamond, Published in *Ibid.*, 1950, 32,379.

18. V. Chandrasekharan, Influence of Optical Activity on Light Scattering in Crystals.—Part II. Sodium Chlorate, Published in *Ibid.*, 1950, 32, 374.

19. T. Radhakrishnan, Further Studies on the Temperature Variation of Refractive Index of Crystals, Published in *Ibid.*, 1951, 33, 22.

20. V. S. Venkatasubramanian, Compressibility and Complex Formation in Electrolytes, Published in Jour. Curr. Sci., 1951, 20, 13.

21. V. Chandrasekharan, Thermal Scattering of Light in Birefringent Crystals, Published in *Ibid.*, 1950, 19, 371.

22. Dr. G. N. Ramachandran and V. Chandrasekharan, Photo-elastic Constants of Sodium Chlorate, Published in Proc. Ind. Acad. Sci., 1950, 33, 199.

23. P. S. Narayanan, Photometry of Raman Spectra of Crystals,—Part II, Published in *Ibid.*, 1951, 33, 97.

24. Dr. G. N. Ramachandran and Ahalya Radhakrishnan, Unit Cell and Space-Group of Sodium Tartrate, Published in Curr. Sci., 1951, 20,36.

25. V. Chandrasekharan, Thermal Scattering of Light in Birefringent Crystals, Published in Proc. Ind. Acad. Sci., 1951, 33.

26. G. Suryan, Magnetic Resonance in Flowing Liquids, Published in *Ibid.*, 1951, 33, 107.

POWER ENGINEERING AND ELECTRICAL TECHNOLOGY

1. Prof. M. S. Thacker and B. S. Prasanna, Resistor Network to the Solution of Field Problems, Problems connected with potential theory are usually solved by using a continuous distribution of a conducting medium. The idea of following the equipotential lines with a prove to solve field problems is quite well known. The usefulness of a resistor network in the field of plotting was only recognised a short time ago and a network to the solution of two-dimensional field problems has been built by S. C. Redshaw based on the finite difference equation for two-dimensional Laplace equation arrived at by Prof. R. V. Southwell. A finite difference equation to the three-dimensional Laplace equation for a particular configuration is arrived at an networks to the solution of various field problems in electrical engineering are indicated.

The position of the probe that moves in the tank is located on a drawing paper by a pantograph arrangement: and then the equipotential points are joined by a smooth curve by hand. An oscillograph is made use of as a detector.

Prof. N. S. Govinda Rao ; B. S. Prasanna ; N. N. Das, Solution of problems of this nature by magnetic analogy is being set up for the study of sub-soil flow of water under dams built on pervious soils.

H.N. Ramachandra Rao and B.N. Narayana Iyengar, A. C. Network Analyser has been installed and commissioned. A study has been made on the Board for the Bombay Grid of their Koyna Project Transmission system.

Prof. M. S. Thacker, Prof. C. S. Ghosh and M. S. T. Narayananan, An analytical study of the performance characteristics of process plants in relation to the electrical energy input factors has been made and a paper entitled " A method determining the performance characteristics of process plants from energy input factors," has been prepared and communicated for publication.

2. Dr. A. Ramachandran, Correlation of Flat Plate Convection Heat Transfer Tests. Forced convention heat transfer from flat surfaces to air streams can be classified in 3 distinct groups:

(*i*) The test surface is located in the centre of a free jet.

(*ii*) The test surface is located in the centre of a wind tunnel air stream.

(*iii*) The test surface is located flush with one wall of the wind tunnel duct.

A new type of correlation is suggested in order that the data from the different experimental arrangements could be more easily compared and the effect of starting lengths evaluated.

3. Prof. M.S. Thacker and H. V. Gopalakrishna, B. Rakosh Das and P. Venkata Rao. The Symmetrical Component Analysis of Unsymmetrical Single Phase Induction Motors. In single phase induction motors, it may be, the main and auxiliary phases are not displaced in space by 90 electrical degrees depending upon the number of stator slots and poles. Also, certain advantages might accrue by deliberate adjustment of the winding with a space phase differing from quadrature. This paper covers in detail the application of the method of symmetrical components to the solution on unsymmetrical single phase induction motors and derives a number of useful relations for the determination of the performance characteristics enabling a designer to consider the limiting cases he is likely to encounter and to what extent the electrical characteristic overlap. The paper is under communication to the American Institute of Electrical Engineers.

A note on the mathematical theory of surge voltage distribution in transformer windings has been given, wherein the limitations of the classic theory, hitherto accepted are indicated. In developing the differential equations for the oscillations occurring between the initial and the final voltage distributions, the exact mathematical theory of leakage field distribution as developed by Mr. Edouard Roth has been used and the effect of this on the frequencies of oscillation is indicated.

By applying Dyadic Algebra, the starting and running performance characteristics of capacitor-start capacitor—run single phase induction motor, have been derived for various values of *a*, the angular displacement in electrical degrees between the main and the auxiliary windings. It is found that the starting torque and torque per ampere reach their respective peak values at about 110^0. Expressions have been derived which enable the designer to predict the value of *a* at which the starting torque is a maximum. The results point out that with the usual sizes of condensers used, the overall performances for both starting and running, will be much better for values of *a* higher than 90^0. There is an appreciable reduction in line current and a pronounced improvement in power-factor.

4. M.S.T. Narayananan, Electrical Analogy for the Solution of Hydraulic Problems, The principal experimental method for the study of potential problems in Hydrodynamics like the flow of water in syphons and sub-soil flow of water under dams built on pervious soils is by an electrolytic tank. The problem in Hydro-dynamics is represented in the electrolytic tank with identical boundary conditions. As a typical problem the flow of water inside a volute syphon is being studied.

A study of certin aspects of approach to the design. of d. c. machines presents certain interesting results which may form a basis for obtaining economical designs of machines with ease and precision. The method developed presents a certain physical picture of the basic electro-magnetic-structure on which the design is built up, developing therefrom a certain logical process of determining ecohomical designs. The steps that are usually followed in the design process of d. c. machines, assume certain values for some of the basic factors involved in the design and the values so assumed depend in a large measure on a variety of conflicting factors, which have to be compromised so that the size and design of machines for the same output and performance are often found to be widely varying according to the circumstances of design, the value chosen and the designers approach to the problem of design. It is, therefore, seldom easy to tell with exactness, whether a particular design has been the best or whether more economical machine could have been provided without imparing the performances and efficiency of the mchine. The object of the study is, therefore, to see if a certain logical process could be developed from the complexity of data, to obtain a design that could be said to be the best both from the point of view of economy and performance.

5. Dr. A. Ramachandran, B. Rakosh Das, and P. Venkata Rao, Temperature Measurements in High Velocity Gas Streams, Temperature measurements in high velocity air or gas streams are a basic necessity in experimentations on heat transfer, wind tunnels, in combustion chamber tests of

gas turbines and in efficiency of turbo compressors. In addition to usual radiation and conduction errors normally encountered, temperature measurements in gases flowing at high velocities is rendered more difficult due to the heat of compression and fractional heat evolved in the gas, while flowing to the temperature measuring device. The survey of the literature has been completed. The design of total temperature probes for temperaure measurements in high velocity has streams is in progress.

Development and further work in the transient inrush of magnetising current of transformers is continued. The leakage field in the transformer during the transient is investigated and it is observed that the voltage due to the leakage field has exactly double the frequency of the current to which it is due.

A detailed analysis has been made of the shaded pole motor and at present detailed experiments are being carried out to test the correctness of the expression derived by applying Dyadic Algebra.

List of Publications

1. Prof. M. S. Thacker and B. S. Prasanna, Wave Form and Core Losses, Published in Electrotecnics, No. 23, 1951.

2. Prof. M. S. Thacker and B. S. Prasanna, Network Analyzer to the Solution of Field Problems, Published in *Ibid.*, No. 23, 1951.

3. Prof. M. S. Thacker and B. Rakhosh Das, A Note on the Theory of Surge Voltage Distribution in Transformer Windings, Published in *Ibid.*, No. 23, 1951.

4. Prof. M. S. Thacker and B. Rakhosh Das, The Inrush of Magnestising Current of Transformers, Published in *Ibid.*, No. 23, 1951.

5. Prof. Chandrasekhar Ghosh, Gneralised Impedance Circle Diagrams in the Analysis of Coupled Networks, Published in Indian Journal of Physics, 24, 223—31.

6. Prof. N. S. Govinda Rao, Design of Volute Siphons, Published in World Congress on Large Dams, 1951.

7. A. Ramachandran, Analogic Experimental Methods in Heat Transfer, Published in *Ibid.*, No. 23, 1951.

8. H. V. Gopalakrishna, Short-Circuit Current Solution for Three Phase Networks, Published in *Ibid.*, No. 23, 1951.

9. Prof. N. S. Govinda Rao, Canal Ejectors and Excluders, Published in International Association for Hydraulic Research.

10. Prof. N. S. Govinda Rao and M. N. Lakshman Rao, Tank Systems in Mysore, Published in First International Commission on Irrigation and Drainage.

PURE AND APPLIED CHEMISTRY

(A) CHEMICAL ENGINEERING SECTION

1. Solvent extraction of castor and mahua seeds by S.K. Nandi and S.K. Aditya.

The effect of reflux ratio on distillation in a bubble cap column is being studied with four binary mixtures having widely different physical properties by S. K. Nandi and S. S. Pandhi.

Investigations on azeotropic distillation and the performance of the ternar system ethanol-water-benzene have been taken up by S. K. Nandi and G. N. Bhat.

Preparation of active earth and its ability to decolourise vegetable oils is being studied with different varieties of Fuller's earth available in India by S. K. Nandi and K. Shivaramiah.

An experimental unit for the fluidised coal gasification capable of fluidising and gasifyig 10—20 lb. of coal per hour, has been erected by S. C. Ghosh and A. V. Raman Rao.

Studies on catalytic cracking of kerosene oil with a view to replace the present thermal cracking system of gas production by a suitable electrical unit are being carried out by S. S. Ghosh and T. Purnanadam.

An apparatus to determine the swelling properties of various types of coals has been made by S. S. Ghosh and M. Ramacharyulu.

Papers Published

1. S. K. Nandi and S. P. Samaddar, Distillation in presence of added components, Published in Trans. Ind. Inst. Chem. Engrs., 1948-49, 2, 29.

2. G.N. Bhat, Some Aspects of the Emulsion Process of Wool Scouring, Published in Ind. Text. Jour., 1950, 61, 34.

GENERAL CHEMISTRY SECTION

A. INORGANIC AND MINERAL CHEMISTRY

1. (Upgrading of ores) Chlorination by R. Manocha, C. C. Patel and B. Sanjiva Rao.

(*ii*) By Ore Dressing Method by N. S. Krishna Prasad, C.C. Patel, M.R. A. Rao, and B. Sanjiva Rao, etc.,

2. Studies on Clay by M. S. Narasinga Rao, M. R. A. Rao and B. S Sanjiva Rao.

3. Phosphatic Fertilisers from Rock Phosphate and Phosphatic Nodules, by V. V. Dadape, K.G. Shenoy, A.R. Vasudeva Murthy, M. R. A. Rao and B. Sanjiva Rao.

4. Studies in Oxides of Sulphur by A. R. Vasudeva Murthy, M. R. A. Rao and B. Sanjiva Rao.

5. Analytical, Polarography by R. S. Subrahmanaya, M. R. A. Rao and B. Sanjiva Rao.

(*ii*) Spectrophotometry by A. R. Vasudeva Murthy, V. V. Dadape and M. R. A. Rao.

(*iii*) Karl Fischer's Method by A. R. Vasudeva Murthy, V. V. Dadape and B. Sanjiva Rao, etc.

PHYSICAL AND GENERAL CHEMISTRY

1. (Catalytic Reactions at High Temperature and Pressure)

(*i*) Oxo-reaction by B. C. Subba Rao and S. K. Bhattacharyya.

(*ii*) Synthesis of Propionic Acid by S. Sourirajan and S.K. Bhatacharyya.

(*iii*) Production of Synthetic Fuels by S. Sourirajan, S.S. Ghosh and S.K. Bhattacharyya.

(*iv*) Production of Synthetic Lubricating Oils, by S. Muthu and S. K. Bhattacharyya.

2. (Catalytic Reactions at Ordinary Pressure.)

(*i*) The Catalytic Oxidation of Croton Aldehyde to Maleic Acid by N. Venkataraman and S. K. Bhattacharyya.

(*ii*) Production of Butadiene from Alcohol by R. Srinivasan and S. K. Bhattacharyya.

(*iii*) Fischer-Tropsch Synthesis, by M. V. C. Sastri and S. R. Srinivasan.

3. Studies in Magnetic Susceptibilities of Catalyst Powders by V. Rama krishna and S. K. Bhattacharyya.

4. Differential Thermal Analysis of Solid Catalysts by S. N. Gopalaswamy and S. K. Bhattacharyya.

5. Studies in Adsorption of Gases on Catalysts.
(*i*) Fischer-Tropsch Catalyst by M. V. C. Sastri and S. Vedaraman.

(*ii*) Methanol Catalyst by M. V. C. Sastri and H. Srikant.

6. Colloid Chemistry.

(*i*) Work upon the complexes between proteins and detergents has been carried out, by M. A. Cohly and M. R. A. Rao.

(*ii*) Investigations on the chlorination of rubber latex were continued by N. H. Sivaramakrishnan, G. S. Rama Iyer, M. R. A. Rao and B. Sanjiva Rao.

(*iii*) The technical production of silica by G.C. Patel and B. Sanjiva Rao.

7. Electrochemistry.

(*i*) The electrodeposition of copper, zinc and tin and some of their alloys from the pyrophosphate type of bath is being studied. The copper pyro-phosphate appears to be promising, by R. P. Singh and T. L. Rama Char.

(*ii*) Electrodeposition of nickel and silver from sulphamate and pyrophosphate baths, by G. R. Nagarak and T. L. Rama Char.

(*iii*) Electrcdeposition of lead, cadmium and zinc and some alloys, as alternatives to the existing baths by J. Mathur and T. L. Rama Char.

8. Chemical Kinetics.

The kinetics of the reaction between iodine and various unsaturated organic acids, by P. K. Bhandari and S. K. Bhattacharyya.

List of Publications

1. J. C. Ghosh, M. V. C. Sastri, S. Vedaraman, Adsorption Studies on Methanol Synthesis Catalysts, 1. Adrosption of Carbon Monoxide and Hydrogen on Zinz Oxide-Chromium Oxide Mixture, Published in Jour. Curr. Sci., 1950, 19. 342.

2. J. C. Ghosh, M. V. C. Sastri and K. A. Kini, Mixed Adsorption of Hydrogen and Carbon Monoxide on Fischer-Tropsch Catalysts, Published in Jour. Research, December, 1950.

3. S. K. Kulkarni Jatkar and S.N. Gopalaswamy, Dielectric Constant of Seignetoelectrics II. KH_2PO_4. $NH_4H_2PO_4$-KH_2ASO_4 and NH_4F_2 ASO_4, Published in Zhur. Eksptl. Teoret Fiz. (U.S.S.R.), 1950, 20, 607—81.

4. M. R. A. Rao, Electron Microscopic Studies on Aqueous Sols, Published in Proc. Phys. Soc., 1950, 63 B, 980.

5. M. V. C. Sastri and H. Srikant, Adsorption of Hydrogen at Elevated Pressures on a Promoted Iron Synthetic Ammonia Catalyst, Published in Jour. Curr. Sci., 1950, 19, 313.

6. M. V. C. Sastri, and H. Srikant, Adsorption of Nitrogen at Elevated Pressures on a Promoted Iron Synthetic Ammonia Catalyst, Published in *Ibid.*, 0. 343.

7. M. V. C. Sastri and H. Srikant, Mixed Adsorption of Hydrogen and Nitrogen at Elevated Pressures on a Promoted Iron Synthetic Ammonia Catalyst, Published in *Ibid.*, 1951, 20, 15.

8. T. L. Rama Char and R. Sadagopacari, Electro-deposition of Metals and Alloys from Cyanide-free Baths, Part I. Silver from Iodide Solutions, Published in *Ibid.*, 1950, 19, 284.

9. T. L. Rama Char and N. B. Shivaraman, Electro-deposition of Metals and Alloys from Cyanide-free Baths. Part II. Copper from Ethanolamine Solutions, Published in *Ibid.*, 1950, 19, 311.

10. R. Srinivasan and G. D. Hazra, Studies in the Catalytic Production of Butadiene from Etanol. Part V, Published in Jour. Science and Culture, 1950, 16, 75.

11. R. Srinivasan and G.D. Hazra, Studies in the Catalyic Production of Butadiene from Ethanol, Part VI, Published in *Ibid.*, 1951, 16, 329.

12. R. Srinivasan and G. D. Hazra, Studies in the Catalytic Production of Butadiene from Ethanol, Part VII, Published in *Ibid.*, 1951 16, 421.

ORGANIC CHEMISTRY SECTION

ESSENTIAL OILS AND TERPENES

(*i*) Essential Oil from Hymenatherun tenhifolium, Cass Isolation of a New Acyclic Monoterspene,

(*ii*) Essential Oil from Ocimum gratissimum Roxb, the Russian variety have been completed.

(*iii*) Essential Oil from the Oleo-resin of Dipterocarpus indicus.

(*iv*) Study of the esquiterpenes of Piper cubeba Linn.

(*v*) Essential Oil from leaves of Psidium guayava (Guava).

(*vi*) Fractions IV and V These appear to be cadenylic alcohols, as they gave cadalene on dehydrogeneration, but are not cadinols, since they did not form any solid cadienene dihydro-chloride. They also showed the presnce of exocyclic double bonds as they give formaldehyde on ozonolysis. Further work is in progress.

(*vii*) Essetial Oil from Lansium anamalyanum Structure of β-Chigadmarene.

by U. G. Nayak, G. S. Krishna Rao, R. K. Razdan, Asharam Bhati, A. Somasekhar Rao, S. C. Bhattacharyya and P. C. Guha.

(*i*) Towards the Synthesis of S-Guaiazulene.

(*ii*) Attempts to Prepare a New Aromatic System.

(*iii*) Condensation of Cyanoacetic Ester with Ketones.

(*iv*) On Synthesis of Manasse's Keto Acid by R. C. Gupta and P. C. Guha.

Studies in resins by I. S. Patel and P. C. Guha.

Investigations on Caradamom (Government of Mysore Scheme) by P. P. Krishnan and P. C. Guha.

SYNTHETIC DRUGS

Synthetic Antimalarials

(*i*) Sulphonamido-biguanides.

(*ii*) Derivatives of Sulpha pyrazines.

(*iii*) Biguanido-derivatives of 2: 5 dibromo-phenyl sulphonamide.

(*iv*) Sulphanilamido-guanides.

(*v*) Quinolyl-biguanides.

(*vi*) Aryl-substituted biguanides.

by S. S. Guha A. C. Roy, P. R. Gupta, L. Neelakantan and P. C. Guha.

ANTI-TUBERCULAR DRUGS

(*i*) Metanilamide Derivatives.

(*ii*) Biguanido Compounds of Diaryl Sulphoues and Sulphides

(*iii*) Thiocarbamido Derivatives of Diphenyl Sulphoues and Sulphides.

Azo-dyes, by K. V. Viswanathan, K. Raman, J. R. Iyengar, B. N. Jayasimha, M. Raghavan, S. C. Bhattacharyya and P. C. Guha.

Thespesia populnea, by K. Lingamurthy, M. R. Rajarama Rao and S. C. Bhattacharyya.

A New Colour-Reaction of Phenols, by M. V. Bhatt and P. C. Guha.

Ingredients of Wood Tar, by A. V. Kamath and P. C. Guha.

Assam Coal Carbonisation, by P. C. Guha.

Studies with Sulphuryl Chloride, by V. Lakshminarayana and B. H. Iyer.

Studies in Paper Chromatography, by K. Lingamurthy and B. H. Iyer.

Cultivation of Blood Parasite in vitro.

Studies of Parasite Metabolism.

List of Publications

1. A. V. Kamath and P. C. Guha, Studies in Wood-Tar Constituents, Published in Jour. Science and Culture, 1950, 16, 210.

2. P. R. Gupta, and P.C. Guha, The Synthesis of 5-Biguanidyl-acridines, Part I, Published in *Ibid.*, 1950, 16, 257.

3. A. C. Roy and P. C. Guha, Studies in Antimalarials, Part XIII, Biguanido-aryl-arsenicals, Published in J. Council of Sci. and Ind. Res., 1950, 9B, 242.

4. A. C. Roy and P.C. Guha, Guanidines, Thioureas and Biguanides of 2-Aminopyridine, Published in *Ibid.*, 1950, 9B, 262.

5. P. R. Gupta and P. C. Guha, N^4-(Biguanidyl-substituted)-N^1-benzoyl Sulphanilamides, Published in Curr. Sci., 1950, 19, 312.

6. P. C. Guha and S. C. Bhattacharyya, Chemotheraphy of Filariasis, Published in (Indian Pharmaceutical Conference. 1951, Bangalore Session.)

7. A. S. Ramaswamy, R. Rama Rao and N. N. De, Studies on Anaemia in Chicks Infected with P. gallinaceum, Published in Proc. Ind. Acad. Sci., 1950, 32B, 126.

8. M. Sirsi, A study on the Methods of Isolation and Culture of *m*-Tuberculosis, Published in Curr. Sci., 1950, 19, 216.

9. M. Sirsi, P. R. Gupta and R. Rama Rao, An in vitro study on the Action of Acridine Biguanide Derivatives upom Pathogenic Micro-organisms, Published in *Ibid.*, 1950, 19, 293.

10. A. S. Ramaswamy, R. Rama Rao, N. K. Keshavamurthy, and N. N. De, Antimalarial Activity of Aureomycin in Blood Induced Infection in Chicks, Published in *Ibid.*, 1950, 19, 245.

11. M. Sirsi, R. Rama Rao and N. N. De, Antibacterial Activity of Some Quinoline Substituted Guanides, Published in *Ibid.*, 1950, 19, 319.

12. V. R. Sreenivasan, V. Ramamurthy and N. N. De, Partition Phosphorus in Blood of Chicks during Infection with P. galliaceum, Published in *Ibid.* 1951, 20, 37.

Economics and Social Sciences

1. Measurement of Industrial Efficiency.
2. Security Index.
3. Testing Imagination by Inkblots.
4. Work in the Indian Telephone Industries.
5. Labour Management Co-operation.
6. Critteria of Industrial Advance,

List of Publications

1. M. C. Munshi, Measurement of Industrial Efficiency.

2. M. C. Munshi, Economic Incentives, Published in Indian Journal of Economics, January 1951.

3. Dr. N. S. N. Sastry and S. K. Ramachandra Rao, Testing Imagination by Projection, Technique, Published in Curr. Sci., 1951, 20, (2), 36-37.

PLANT BREEDING

ESSENTIAL OILS

(*i*) The possibilities cultivating Ocimum kilimanjaricum as a source of camphor were further investigated.

(*ii*) Pogostemon Cablin.

(*iii*) Among other essential oil-bearing plants under experimental cultivation, one of the most promising is a new Jasmine (Jasminum odoratissimum which is a staple species in Madeira and Formosa for the production of oil of jasmine. The requisite plant material was imported and is now being cultivated.

By B. S. Nirody.

OTHER OILS

Foundation material of a new strain of the Hungarian Sunflower (Helianthus annuus) credited with an exceptionally high of content received from abroad is under experimental cultivation.

SUBSIDIARY FOOD CROPS

(*i*) The Queensland Arrowroot. (*ii*) Buckwheat. (*iii*) New Type of Sweet Potatoes. (*iv*) Soya Beans. (*v*) The Molasses Grass.

DEPARTMENT OF AERONAUTICAL ENGINEERING

Name	Subject	Year
Dr. O. G. Tietjens	Special Lectures	I & II
C. V. Joga Rao	(*a*) Advanced Mathematics (*b*) Strength of Materials	I I & II
Dr. G. V. R. Rao	Special Lectures on Applied Mathematics	I & II
Y. V. Gururajacharya ..	(*a*) Fundamental of Fluid Mechanics (*b*) Airfoil Theory (*c*) Viscosity and Turbulence (*d*) Compressibility	I I II II
G. Janaki Ram	(*a*) Airplane Structures (*b*) Airplane Design (*c*) Airplane Structures (*d*) Airplane Design	I I II II

Name	Subject	Year
C. N. Lakshminarayana	(*a*) Airfoil Characteristics	I
	(*b*) Propellers	I
	(*c*) Performance of Aircraft	II
	(*d*) Stability	II
P. Srinivasa Row ..	(*a*) Theory and Operation of Aircraft Instruments. Flight Instruments and Engine Instruments	I
	(*b*) General theory and operation of Aircraft Instruments. Autosyn, Selsyn and other remote indicating systems. Gyrodynamics, Gyroscopic Flight Instruments. The Autopilot	II

TUTORIALS

Subject	Conducted by
1. Aerodynamics	Messrs. Y. V. Gururajacharya and C. N. Lakshminarayana
2. Structures	Messrs. C. V. Joga Rao and G. Janaki Ram.
3. Airplane Design	Messrs. Y. V. Gururajacharya and G. Janaki Ram.

LABORATORY WORK

Experiments on Pressure Distribution in Airfoils in the Small Wind Tunnel .. .. Mr. T. N. Krishnaswamy.

PRACTICAL TRAINING

The students of the I and II year diploma course had their practical training at Hindustan Aircraft Factory, for five months, in the following sections:

I. Manufacturing

II. Accessories

III. Engines

IV. Airplane Overhaul

V. Field Service

VI. Landing Gear and Propeller

VII. Design

VIII. Aircraft Instruments.

As a result of modified scheme of practical training the staff members were deputed in turn to the factory to instruct the students in the handling of instruments.

DEPARTMENT OF BIOCHEMISTRY

BIOCHEMICAL SOCIETY

1. The following lectures were delivered under the auspices of the above Society:

Date	Speaker	Subject
31-7-50	Mr. B. N. Banerjee ..	" Role of Unsaponifiable Matter in Edible Oils."
16-8-50	Mr. K. Venkaratamanan	" Public Health Research in India."
8-9-50	Prof. J. W. McBain ..	" Properties of Soap Films."
25-10-50	Mr. K. V. Sundaram Iyer	" Analysis of Food."
28-10-50	Dr. K. V. Giri ..	" Development and Organisation of Scientific Research in Sweden "
5-1-51	Dr. L. Fieser	" Cholesterol and Cancer."

14-2-51	Dr. V Subrahmanyan	"Synthetic Grains"
23-2-51	Dr. A. S. Ramaswamy	"Physiology of Muscular Contraction."
26-2-51	Dr. A. S. Van Veen	F.A.O. and Food Technology.

2. A number of lectures were arranged on bacteriology, enzymes and fermentation under the auspices of the Society of Fermentation Technologists (India).

3. Three symposia were held on:—
(*i*) Micro-Biological Assay;

(*ii*) Medical and Industrial Aspects of Fungi;
and (*iii*) Synthetic Foods.

DEPARTMENT OF ELECTRICAL COMMUNICATION ENGINEERING

LECTURE AND LABORATORY WORK

Lectures and laboratory work for the students of Electrical Communication Engineering and of Electrical Technology were conducted as under during the 1950-51 Session.

Name	Subject	Year
	Electrical Communication Engineering Students	
Prof. K. Sreenivasan	Vector Analysis and Electronics	I
	Electronic Engineering	III
	Transmission Circuits and Transmission Lines	III
Dr. B. S. Ramakrishna	Applied Mathematics	I
	Applied Mathematics	II
	Acoustics	III
	Acoustics Laboratory	III
H. C. Basak	Line Communication	II and III
	Line Communication Laboratory	II and III

V. Narayana Rao	Electromagnetic Theory and Applications	III
	Electromagnetic Theory	II
	Radio Laboratory	III
S. Seshu	Receivers	III
	Electronics	II
K. V. Seshadri	Physics	I
H. R. Bapuseetharam	Physics	I

Electrical Technology.

Prof. K. Sreenivasan	Electronics	II
H. C. Basak	Line Communication	II and III
V. Narayana Rao	Radio Engineering	III
	Radio Laboratory	II
H. R. Bapuseetharam	Radio Laboratory	II (1st term)

DEPARTMENT OF INTERNAL COMBUSTION ENGINEERING

The following lectures were delivered by the members of Staff:

Name	Subject
Dr. H. A. Havemann	(*a*) Fuels and Their Combustion. (*b*) Advanced General Thermodynamics. (*c*) Gas Dynamics and Fluid Flow. (*d*) General Items, History and Trend of Development of I.C. Engines.
M. R. K. Rao	(*a*) Formation of Fuel-Air-Mixtures. (*b*) Injection and Carburetion. (*c*) Means of Carrying Out the Proposed Thermodynamic Cycles—4-Storke. (*d*) Kinematics

K. Mahadevan	(*a*) Thermodynamic Principles of Heat Engines and Application of these Principles. (*b*) Thermodynamic Caculations for I. C. Engines. (*c*) Heat Transfer in I. C. Engines. (*d*) Lubrication of I. C. Engines.
A. V. Sreenath	(*a*) Means of carrying out the proposed Thermodynamic Cycles—2-Stroke. (*b*) Design of I. C. Engines. (*c*) Testing of Engines. (*d*) Details of Power Plant Arrangement.
N. T. Gopala Iyengar	(*a*) Means of Carrying Out the Propose Thermodynamic Cycles for Gas Turbines. (*b*) Supercharging of I. C. Engines. (*c*) Dynamics of Piston Engines and Gas Turbines.
N. N. Narayana Rao ..	Petrol Spark Ignition.
P. Srinivasan	(*a*) Design of Cooling Arrangement in I. C. Engines.

EXTRA DEPARTMENTAL WORK

Lectures on ‘ Aero Engines ’ were delivered by the Head of the Department (H. A. Havemann) to I and II year Students of the Aeronautical Department.

COLLOQUIUM

Date	Speaker	Subject
5-8-50	M. R. K. Rao ..	Diesel Engine Production in India.
12-8-50	M. R. K. Rao (Discussion) ..	Diesel Engine Production in India.
19-8-50	A. Natarajan ..	Dynamics of Injection.

26- 8-50	M. R. Raghavan	Design of Combustion Chamber for Combustion Ignition Engines.
2- 9-50	K. V. Iyer	Metallurgical Aspects of Gas Turbine Blade Materials.
9- 9-50	K. Narayanaswamy	2-Stroke Diesels.
16- 9-50	N. N. Narayana Rao	Rotary Valve Engines.
23- 9-50	N. T. Gopala Iyengar	Testing of Aero Gas Turbin.
30- 9-50	N. T. Gopala Iyengar	Testing of Aero Gas Turbine.
7-10-50	K. Mahadevan	Cowlings and Baffles in Aero Egines.
11-11-50	A. V. Sreenath	Blowers for Scavenging 2-Stroke Engines.
18-11-50	P. Srinivasan	Dimensional Analysis in Heat Transfer.
25-11-50	K. Mahadevan	Chemistry of Gasification.
2-12-50	M. A. Thirunarayanan	Coal Dust Engines.
9-12-50	A. Natarajan	Cathode-Ray Oscilloscope.
16-12-50	S. Krishnamurthy	Mobile Producer Gas Plant.
3- 2-51	A. V. Sreenath	Producer Gas as a Fuel for Petrol-Driven Vehicles.
17- 2-51	N. N. Narayana Rao	Aspects of Hot Air Engines.
23- 2-51	M. R. K. Rao	Fuel System for Gas Turbines.
10- 3-51	M. R. K. Rao	Fuel System for Gas Turbines.
17- 3-51	R. G. Narayanamurthy.	Quasi Steady Gas-flow, its application to the calculation of die-away pressures, and instantaneous thrust in single Cylinder Engines.

Apart from the weekly colloquium, a monthly meeting is arranged during which every member of the staff and every student reports on the progress of his work, difficulties encountered, etc.

DEPARTMENT OF METALLURGY

Lectures and laboratory work for the student of the Metallurgy Department were conducted during the session 1950-51 on the following subjects.

Names.	Subjects.
Dr. E. G. Ramachandran	Physical Metallurgy.
J. Balachandra	Electrometallurgy.
Dr. N. R. Srinivasan	Mineralogical Chemical and Ore Dressing.
Mr. K. V. Aiyer	Production Metallurgy.

In addition to above lectures, students were required to attend the following courses of study

Industrial Economics and Social Sciences.
Fuels.
French and German Languages.
Electrical Engineering.
Workshop Practice.

During the session under review the second batch of students completed thesis research in part fulfilment for the award of the Diploma.

The Department would like to place on record its appreciation to the following industrial works, for their co-operation in affording facilities to the students for practical training during the summer vacation.

(1) The Jamshedpur Technical Institute, Jamshedpur.

(2) The Mysore Iron and Steel Works, Bhadrawati.

(3) The Martin Burn Ltd., Burnpur.

(4) The Indian Aluminium Co. Ltd., Alupuram, Alwaye.

Early this year a Special Lecture on " Metallurgical Research in Western.

Europe" was delivered by Dr. C. Crussard, Director, National Metallurgical Laboratory, Jamsehdpur.

The Department has, as in previous years, rendered assistance to industry in the calibration of instruments and in identification and assay of metals and ores.

DEPARTMENT OF PHYSICS

COLLOQUIA

Date	Speaker	Subject
8-2-51	Dr. G. N. Ramachandran	Optical Activity of Crystals.
15-2-51	Dr. G. N. Ramachandran	Do.
22-2-51	S. S. Sharma	Thermal Expansion of Crystals.
1-3-51	G. Suryan	Nuclear Magnetic Resonance.

DEPARTMENT OF POWER ENGINEERING AND ELECTRICAL TECHNOLOGY

Lectures and Laboratory Coures for Electrical Technology Diploma Course, 1950-51 Session :—

Name	Subject	Year
Prof. C. S. Ghosh	Electrical Engineering Economics	III
	Commissioning of Plants	III
	Electrical Measuring Instruments	II & III
Prof. N. S. Govinda Rao	Water Power Development	III
	Hydraulics	I
	Construction	I
	Applied Mechanics	1 (Third Term)
	Surveying	I
	Drawing	I
D. J. Badkas	Traction	III
	Illumination	III
	Generation	III

Name	Subject	Year
H. N. Rmachandra Rao	Transmission and Distribution	III
	Protection and Switchgear	III
	Transmission Project Design	III
Dr. A. Ramchandran	Heat Power	I & II
	Applied Mechanics	I
B. N. Narayan Iyengar	A. C. Technology	II & III
H. V. Gopalakrishna	Electric Circuits	I
	Drawing	II
	Electric Shop and Istallation	II
	Electrical Measurements	II
	Tutorial Classes	II
	Electrical Laboratory	II & III
P. Venkata Rao	Tutorial Classes	III
	Rectifiers	III
	A. C. Design	III
	Drawing and Project	III
	Electrical Laboratory	III
M. S. T. Narayanan	D. C. Technology	II
	D. C. Design	II
	Electrical Engineering I Year (Students of Chemical and Metallurgy Departments)	
	Electrical Laboratory	II
	Electrical Shop and Installation	II
Prof. K. Sreenivasan	Electronics	II
Dr. B. S. Ramkrishna	Applied Mathematics	I & II
V. Narayana Rao	Electronics	III
	Electro-Magnetic Theory	II
H. C. Basak	Telephony	II
Dr. N. S. N. Sastry	Psychology	I & II

Dr. M. C. Munshi	Economics	I & II
Dr. W. Graefe	Mod. European Languages	I & II
Dr. G. T. Kale	Mod. Europea Languages	I & II (upto Nov. 1950)
Dr. (Mrs.) H. Kale	Mod. European Languages	I & II (upto Dec. 1950)

VACATION TRAINING—1951

Name of Works	No. of Students
1. Associated Electrical Industries (India) Ltd., Calcutta	7
2. The Bombay Electric Supply and Transport Undertaking, Bombay	8
3. Messrs. Burn & Co., Calcutta	8
4. Calcutta Electric Supply Corporation Ltd., Calcutta	4
5. New Delhi Municipal Committee	1
6. The Delhi Central Electric Power Authority	2
7. East Punjab P. W. D. Electricity Branch	2
8. The Empress Mills Ltd., Nagpur	1
9. Messrs. Garlic & Co. Ltd. Bombay	1
10. G.I.P. Railway, Bombay	3
11. East India Railway Workshop, Lucknow	1
12. Hirakud Dam Project, Hirakud	2
13. English Electric Co. Ltd., Calcutta	2
14. Messrs. Chitram & Co., Madras	1

15. Jessop & Co., Calcutta	5
16. Jammu & Kashmir Government Electricity Department	1
17. Jamshedpur Technical Institute, Jamshedpur	1
18. Kirloskar Electric Co., Ltd., Bangalore	1
19. Mangalore Electric Supply Co., Ltd., Mangalore	1
20. Madras Government Electricity Department	7
21. Government Electricity Department, Madhya Pradesh	1
22. The Mysore Iron & Steel Works, Ltd., Bhadravati	2
23. Mysore Government Electricity Department	12
24. Government Electricity Department, Orissa	2
25. Public Works Department	1
26. Messrs. Radio and Electrical, Madras	1
27. Hindustan Aircraft Ltd., Bangalore	1
28. Saxby and Farmer (India), Calcutta	3
29. Tata Hydro-Electric Co.	1
30. Travancore Government Electricity Department	1
31. Tata Iron & Steel Co., Ltd., Jamshedpur	2

ELECTRICAL ENGINEERING SOCEITY

Lectures Delivered during 1950-51 Session.

Name	Subject
B. N. Narayan Iyengar	A. C. Network Analyzer.
H. N. Srivastava	Power Supply to Telephone Exchanges.
Prof. N. S Govinda Rao	Designing Reservoirs for Power Development.
M. Aswath	Power System Interconnections.
V. R. Thiruvenkatachar	External Problems.
D. Seshachar	Technique of Incandescent Lamps.
C. A. Wagner	Radio Manufacture.
Sir Vincent de Ferranti	The Great Ferranti.
R. M. Charley	Transformer Engineering
Brig. B. N. Patra	Development of E.M.E. Corps.
Prof. M. S. Thacker	Inaugural Address.

Technical films exhibited under the auspices of the Electrical Engineering Society, 1950-51 :—

Electro-Magnetic Induction.

Electro-Magnetic Induction.

Civil Engineering.

This is Britain No. 22.

This is Britain No. 8.

A Glimpse of Metrovicks.

Tennesse Valley Authority.

Tennesse Valley Authority.

Look and Listen.

Gift of TS' Ailum.

Popular Science, Volume No. 2.

Automobile Spark Plugs.

Electronics in Industry.	Electronics in Industry, Parts I,II, III and IV
Planned Electrification.	

The Department rendered assistance and co-operated with the following firms in carrying out tests according to standard specifications on their products in repairing different instruments and helped in solving other problems:

1. Government Porcelain Factory, Bangalore.
2. Messrs. Crompton & Parkinson (Works) Ltd., Bombay.
3. Mysore Government Electrical Department.
4. Government Electric Factory, Bangalore.
5. Messrs. Harisons & Crosfield Ltd., Quilon.
6. Messrs. Hardcastle Waud & Co., Ltd., Bombay.

6*a*. Industrial Chemical Works, Lonavala.

7. Messrs. I. A. E. C. (Mysore) Ltd.
8. Messrs. Indian Telephone Industries, Bangalore.
9. Messrs. Lalwani Radio Corporation, Bangalore.
10. Messrs. Radio & Electrical Ltd., Madras.
11. Messrs. Mysore Commercial Union Ltd., Bangalore.
12. Messrs. Singareni Collieries Co., Ltd.
13. Mysore Vegetable Oil Products, Bangalore.
14. Messrs. Hindustan Aircraft Ltd., Bangalore.
15. Messrs. Indian Aluminium Co., Alwaye.

DEPARTMENT OF PURE AND APPLIED CHEMISTRY

CHEMICAL ENGINEERING SECTION

Fifteen students were admitted to the Chemical Engineering Course in July 1950, out of whom, twelve joined. The course of lectures extended from July 1950 to March 1951. The approximate number of lectures delivered on different subjects are given below:

Subject	No. of Lectures	Name
Chemical Engineering Unit Operations	40	S. K. Nandi.
	90	G. N. Bhat.
Mechanical Engineering	50	B. A. Sundara Moorthy.
Fuels	20	S. S. Ghosh.
	12	A. V. Raman Rao
Colloid Chemistry	22	A. R. Vasudeva Murthy
Thermodynamics and Gas Reactions	17	Dr. S. K. Bhattacharyya
Electrical Engineering	40	M. S. Tirrunarayanan
Industrial Economics	19	Dr. M. C. Munshi.
Industrial Psychology	15	Dr. N. S. N. Sastry.

The students were also required to attend lectures on German and French Languages, and the prescribed course in Workshop Practice. Details of practical work done by the students are given below:

Engineering Drawing—90 hrs.	B. A. Sundara Moorthy Dr. T. L. Ramachar.
Laboratories, Physical Chemistry — 40 hrs.	G. N. Bhat and K. Shivaramaiah.

Analytical Chemistry—75 hrs. —G. N. Bhat and
Chemical Engineering Unit Operaions— — K. Shivaramaiah.
—60 hrs.

During the year under report, visits by the First Year students to various factories in and around Bangalore were arranged. They are also been deputed for factory training for a period of two months, to the factories noted below:

M. R. Prabhu U. B. Nayak	—Mettur Chemical & Industrial Corporation, Mettur Dam.
B. R. Lakshman Rao	—Mysore Glass & Enamel Works, Bangalore, and Mettur Chemical & Industrial Corporation, Mettur Dam
T. R. Gupta	D. C. M. Chemical Works, Delhi.
C. Rai	Dyer Meakin Breweries, Ltd., Lucknow
A. N. Narayana Swamy	—Eastern India Distillieries and Sugar Factories, Ranipet.
R. C. Vasisth	—Tata Iron & Steel Works, Jamshedpur, —Orissa Cement Co., Ltd.
M. Mohan Rao P. K. Deshpande	Tata Chemicals, Mithapur.
P. B. Rama Rao	—Mysore Iron & Steel Works, and Mysore Paper Mills, Bhadravati.
C. S. Ramanathan	Travancore Rayons, Travancore.

We are thankful to the athorities of the above noted factories for having kindly agreed to provide facilities for training our students as apprentices.

Students who were admitted to the course in July 1949 continued from July 1950 to October, during which period they had 50 lectures on Chemical Engineering by Mr. S. K. Nandi and lectures on Mechanical Engineering by Mr. T. Nagesha Rao, on Applied Thermodynamics by

Dr. M. V. C. Sastri on Fuels by S. S. Ghosh, on Electro-Chemistry by Dr. T. L. Ramachar, on Refractories and Mineral Resources by Dr. N. R. Srinivasan, and on Unit Processes in Organic Synthesis by M. Raghawan. The students also attended lectures on Industrial Economics and Psychology, on French and German Languages, and the prescribed course in Workshop Practice and Engineering Dawing. Practical Work in the Chemical Engineering Laboratories covered 75 hours of work during the term.

The Second Year student went on a study tour to various factories in Mysore State and South India.

GAS HOUSE.

Gas House of the Institute has been put in charge of the Chemical Engineering Section from 15th April 1950, Mrs. S. S. Ghosh was the Officer-in-charge of Gas House till January 1951 and since then B.A., Sundara Moorthy has ben looking after these duties.

CHEMICAL ENGINEERING ASSOCIATION

The following Office-bearers were elected for the current year:

President	Prof. M. S. Thacker.
Vice-Presidents	Prof. P. C. Guha.
	Prof. B. Sanjiva Rao.
	S. K. Nandi.
	Dr. S. K. Bhattacharyya
Secretaries	S. S. Pandhi. U. N. Bharany.

Lectures arranged by the Assocation are given below:

Speaker	Subject
Sir C. V. Raman	Feld-Spar
S. K. Nandi..	Solvent Extraction of Vegetable Oils.
Dr. S. S. De	Dehydration of Foodstuffs
S. S. Ghosh	Role of Analysis in Fuel Research
J. Mathur	Indian Iron and Steel Industry
Prof. M. S. Thacker ..	World Power Conference.
Prof. M. N. Saha	Atomic Energy Developements.
Dr. M. R. A. Rao	Applications of Radio-Chemistry.
Dr. B. H. Iyer	Industry and Research.
M. Sreenivasaya	Some Aspects of Fermentation Technology

Dr. S. K. Bhattacharya..	Fluidisation—A New Chemical Engineering Tool and its Industrial Applications.
Dr. M. V. C. Sastri	Surfoces of Catalysts.
Dr M. C. Munshi	Incentives in Industry.
Prof. Brahm Praksh	Rotation Fundamentals.
Dr. E. G. Ramachandaran	Stainless Stocks.

The Association was very helpful in organizing the Third Annual Session of the Idian Institute of Chemical Engineers held at the premises of he Indian Institute of Science, Bangalore, from 30th December 1950 to 1st January 1951.

GENEAL CHEMISTRY SECTION

COLLOQUIUM

Date	Speaker.	Subject.
16-2-51	Prof. N. R. Dhar	Oxiadation of some Energy Materials and Nitrogen Fixation.
19-2-51	Dr. S. K. Bhattacharya ..	Recent Advances in High Pressure Chemistry.
23-2-51	Dr. M. R. Aswathanarayana Rao.	Electron Microscope and the Structure of Colloids.
28-2-51	R. S. Subhrahmanya	Some Studies in Polarography.
5-3-51	M. A. Cohly	Complex Formation of Proteins and Detergents.
8-3-51	Dr. T. L. Ramachar	Some Aspects of Electro-Deposition of Silver.
12-3-51	Prof. B. Sanjiva Rao	Chlorination of Minerals.
13-3-51	Prof. K. S. Gururaja Das	Some Newer Methods in the Study of Electrode Phenomena.
16-3-51	Dr. M. V. C. Sastri.. ..	Adsorption of Gas Mixtures on Catalyst Surfaces.
19-3-51	R. S. Phadke	Dipole Moments of Fatty Acids.
21-3-51	S. Vedaraman	Surface Area Determination.
24-3-51	Prof. N. R. Dhar	Nitrogen Transformation and Loss.

26-3-51	M. S. Narasinga Rao	Some Aspects of Clay Chemistry.
28-3-51	M. A. R. Vasudeva Murthy	Lower Oxides of Sulphur.

EXTRA DEPARTMENTAL WORK BY G. C. STAFF

The following lecture classes were taken by members of the Staff for the Section of Chemical Engineering:

Name	Subject
Dr. S. K. Bhattacharyya	Thermodynamics
Dr. T. L. Ramachar	Applied Electro-Chemistry
A. R. Vasudeva Murthy	Colloid Chemistry

ORGANIC CHEMISTRY SECTION

COLLOQUIA

Subject	Speaker
Sesquiterpenes of Sandalwood Oil	Dr. S. C. Bhattacharyya
Diterpenes	Do.
Modern Technique in Organic Chemistry	Dr. B. H. Iyer
Introduction to Polymer Chemistry	Dr. M. S. Muthanna
Copolymerisation	Do.
Theory of Organic Reactions	Do.
Do. (Conjugated Systems)	Do.
Organic Chemical Theory (Some interesting shifts and rearrangements)	Do.
Cyclic Conjugated Systems	Dr. Sukh Dev.

SECTION OF ECONOMICS AND SOCIAL SCIENCES

Bulletin and Charts.—The *Monthly Econmics Bulletin* has been continued as a Special Issue was brought out for the 38th Session of the Indian Science Congress which was held in the Institute.

A number of charts have been prepared for the use of various departments including those of indicators of economic development and the use of electrical energy.

THE LIBRARY

The following journals were newly subscribed during the year:

1. Annals of the Amer. Acad. of Political and Soc. Sci.
2. Aeronautical Engineering Index.
3. Aeronautical Engineering Review.
4. American Gas Association Bulletin.
5. American Gas Journal.
6. British Journal of Nutrition.
7. Cereal Chemistry.
8. Civil Engineering.
9. Coal Heat.
10. Electricite.
11. Experimental Cell Research.
12. Engineering Journal.
13. First Convertible Aircraft Congress—Proceedings.
14. France Illustration.
15. Food and Nutrition (ceased publication in March 1950).

16. Food Packer.

17. Food Science Abstracts.

18. Gas World (with " Coking " and " Industrial Gas" Supplements)

19. Gas, Wasser, Warme.

20. Industrial Gas.

21. Journal of American Concrete Institute.

22. Journal of Association of Official Agricultural Chemists.

23. Journal of Commerce and Statistics.

24. Journal of Diesel Engine Users' Association.

25. Journal of Political Economy.

26. Labour Bulletin.

27. Monatschefte.

28. Modern Packaging.

29. Proceedings of American Society of Civil Engineers.

30. Psychology at work.

31. Prisma.

32. Petroleum Refiner.

33. Petroleum Technology—Journal.

34. Quick Frozen Food and Locker Plant.

35. Transactions of the American Geophysical Union.

36. Transactions of American Society of Civil Engineers.

37. Western Canner and Packer.

38. Weekly Statistical Supplement to the Reserve Bank of India Bulletin.

The following publications have changed their titles :-

Old Title	New Title
1. Journal of Society of Chemical Industry.	Journal of Applied Chemistry
2. Power Generation and Power Plant Engineering.	Power Engineering.
3. Bulletin of Imperial Institute	(1) Colonial Geology and Mineral Resources. (2) Colonial Plant and Animal Products.
4. Indian Coffee Board Monthly Bulletin.	Indian Coffee
5. Collected Papers from Faculty of Science—Osaka University— Series A	Osaka Mathematical Journal

The supply of the following journals have been discontinued :

1. Instruments—suspended from September 1950.
2. Journal of Experimental and Theoretical Physics (Russian).
3. Journal of Physical Chemistry.

The following journals have ceased publications :

1. Food and Nutrition	..	Ceased publication in March 1950.
2. Labour Intelligence	..	Ceased publication from January 1951.
3. Soundings	.. ..	Ceased publication with January 1950 issue.

More German journals which have resumed publication are being procured direct from Germany as well as through Messrs. Langd, Maxwell & Springer, Ltd., London.

The following journals were added to the exchange list during the year:

1. Verhandelingen Afd. Natuurkunde, Sec. 1.
2. Collected Papers from the Osaka University (Series B and C).
3. Bulletin of Geological Survey of Mysore.
4. Bulletin of East Punjab University.
5. Chimia.
6. Reprints from the Central Food Technological Research Institute, Mysore.

THE MECHANICAL EGINEERING SOCIETY, 1950-51

The Mechanical Engineering Society was formed by incorporating the Departments of Internal Combustion Engineering and Aeronautics into what was then called the Metallurgical Society, since it was felt that those Departments were by themselves small to run separate societies.

Elections to various offices were held on September 1, 1950, under the revised constitution and the following were elected unanimously:

President	Prof. M. S. Thacker.
Vice-President	Prof. O. G. Tietjens.
Secretary	P. Srinivasan.
Treasurer	N. Sreenivasan.
Representatives from Metallurgy	Dr. N. R. Srinivasan and V. R. Subramanian.
Representatives from Aeronautics	G. Janaki Ram and K. N. Vaidyanathan.

Representatives from Internal Combustion Engineering K. Narayanaswamy and A. Natarajan.

Editor (Society Journal) .. Prof. O. G. Tietjens.

Editorial Board nominated by the Editor consisting of Messrs. P. Srinivasa Row, E. G. Ramachandran and K. Mahadevan.

PROGRAMME OF LECTURES

Speaker		Subject
1. Sir C. V. Raman ..	..	Viterous Solids.
2. Dr. A. Ramachandran	..	Heat Transfer at High Velocity.
3. Prof. Edy. Velanders	..	Pattern of Engineering Research in Sweden.
4. Sir Vincent De Ferranti	..	Reminiscence.
5. G. Janki Ram	..	Trends in Aero-Structural Desig.
6. Prof. O. G. Tietjens	..	Making Stream Line Pictures.
7. Dr. G. V. Ramana Rao	..	Buckling of Pre-Twisted Pin-Ended Column.
8. M. A. Srinivasan	..	Search for Gold.
9. N. S. Govinda Rao	..	Cavitation Phenomenon in Hydraulic Structures.
10. Prof. Brahm Prakash	..	Role of Metallurgy in Development of Atomic Power.
11. Dr. E. G. Ramachandran		Thermal Analysis.

The Society took the initiative in sponsoring a Symposium under the auspices of all Engineering Societies of the Institute and the Association of Scientific Worker of India, Bangalore, on the "Education of the Engineer." The following people took part in the Symposium: Prof. M. S. Thacker, President, opened the Symposium, followed by Prof. O. G. Tietjens, Prof. H. A. Havemann, Prof. Brahm Prakash, Prof. K. Sreenivasan, Prof. C. S. Ghosh, Prof. N. S. Govinda Rao, Dr. M. C. Munshi, V. S. Hegde, S. S. Pandhi and Dr. T. L. Ramachar.

The following scientific films kindly loaned by the United States Information Service were exhibited to the members during the year:

(1) Magnesium Metal from Sea Water.

(2) Hoover Dam.

(3) Life of a Mechanic.

(4) Bearings in a Modern World.

INDIAN INSTITUTE OF PHILOSOPHY AMALNER

(1) Vedantic Epistemology.

(2) Some Problems of Kantian Philosophy.

(3) The Notion of the Absolute in Western Philosophy.

(4) Sri Aurobindo's Interpretation of Gita.

(5) A Comparative Study of the Hegelian Absolute and the Absolute in Vedanta.

INDIAN SCHOOL OF MINES AND APPLIED GEOLOGY

Geology

1. J. N. Shrivastava, Geology of a part of Keraikela (Seraikela State) for Geology, and completed in 1950.

2. A. K. Mustafy, Geological Study of Digboi Oilfield and Oil Field development, for Geology, and completed in 1950.

3. S. U. Bilgrami, The Mineralogy and Petrology of the Manganese-bearing Rocks of Chikla area (Bhandara District, M. P.), for Geology and completed in 1951.

4. S. D. Ghosh, Geology of a part of Latehar area, Palamau District, Bihar, for Geology, and completed on 1951.

5. S. K. Bose, The Geology of the Emerald-bearing and associated rocks of Rajgarh area (Ajmer-Merwara), for Geology, and completed in 1951.

6. G. B. Misra, Geology of Joda area, for Geology, and completed in 1952.

7. T. S. Rao, Petrology and Straitigraphy of Balaghat area, for Geology, and completed in 1952.

8. R. N. Mitra, Geology of a part of Auranga Coalfield, Palamau Distict, Bihar, for Geology, and completed in 1952.

9. S. Ghosh, Geology of Tisra area, for Geology, in progress.

By Staff

10. N. L. Sharma and N.V.R. Subrahmanyam, A preliminary note on the Petrogenesis of some Mica Traps of Ramnagar area, Raniganj coalfield, Published in Indian Science Congress 1951 and Journal, Geological, Mining and Metallurgical Society, 1952.

11. M. S. Sadashivaiah, (*i*) Petrology of the Dolerite dykes of Jharia Coalfield and Kodarma micafield, Published in Journal, Geological, Mining and Metallurgical Society, 1952.

(*ii*) Occurrence of Chondrodite in the Calc silicate rocks of Latehar (Palamau), Published in Indian Science Congress, 1951.

(*iii*) Pigeonite in the Dolerite Dykes of the Jharia coalfield and Kodarma Micafield, Published in Indian Science Congress, 1951.

12. Y. K. Agrawal, Petrology of Pre-Cambrian intrusive rocks of eastern portion of Jharia coalfield, for Ph.D., (B.H.U.), begun in 1951.

13. Y. K. Agrawal and M. S. Sadashivaiah, A note on the Idiomorphic Felspar crystals from the Pegmatite of Charkhi Mine, Kodarma Micafield, Published in Indian Science Congress, 1952.

Chemistry

1. Dr. K. K. Majumdar, Senior Lecturer in Mineral Dressing, (*i*) Suitability of Ceylon Graphite for crucible Manufacture, begun in 1944, completed in 1948, Pubished in J. Scientific and Industrial Research, V9B, No. 4,105-6 (1950). (New improvements in tecnhique of graphite crucible making has been incorporated in this paper, and suitability of Ceylon graphite as a raw material has also been discussed.)

(*ii*) A Simple Flatation cell, begun in 1949, completed in 1950, Published in J.Sc. Ind. R. V9B, No. 3 (1950). (A new laboratory cell has been described suitable for froth flotation.)

(*iii*) Recent Research on Indian Graphite, begun in 1940, completed in 1949, Published in Indian Minerals, IV, No. 1. (Review of work done by the author and other workers on Indian Graphite.)

(*iv*) Studies in Colloidal Graphite, Part II, begun in 1942, completed in 1944, Published in J. Ind. Chem. Soc. (Ind. & News Ed.), XIII, No. 2V3 (1950). (Method has been described for the preparation of Colloidal graphite in oil to be used as lubricant.)

(*v*) Estimation of Chlorine in Organic Combination in Coal, begun in 1949, completed in 1950, Published in Proc. Ind. Sc. Congress III, (1951). (A new method for estimation of organic Chlorine in Coal has been developed.)

(*vi*) A New Method for quantitative estimation of Xanthate, begun in

1950, completed in 1951, Published in J.Sc. Ind. R 11B. No. 6, 260-1, 1952. (A new method for analysis of Xanthate has been described.)

(*vii*) Contact Angle of Pyrite, begun in 1950, completed in 1951, Published in J. Sc., Ind. R. 11B, No. 5, 203-4 (1950). (Contact Angle of Pyrite has been measured and new behaviour noted.)

Chemistry with Special Reference to Glass, Ceramics and Coal

1. Dr. H. N. Das Gupta, Prof. (*i*) Durability of Soda-Lime Silicate glasses, Part V, begun in 1950, completed in 1950, Published in Journal of Indian Chemical Society. (This deals with the effect of ultraviolet rays on durability of chilled glass. It has been shown that the chemical durability increases when such glasses are exposed to U. V. light.

(*ii*) Self-glaze cordierite bodies, begun in 1950, completed in 1951, Published in Journal of Indian Chemical Society. (Deals with the manufacture of high frequency insulating materials which are also self-glazed.)

(*iii*) Studies on ceramic Raw materials, Part I, begun in 1950, completed in 1951, Published in Journal of Indian Chemical Society. (Deal with the changes that intrinsic iron undergo when ceramic bodies are subjected to firing.)

(*iv*) Studies on ceramic Raw materials, Part II, begun in 1950, completed in 1951, Published in Journal of Indian Chemical Society 3 and 4. (Deal with the changes that intrinsic iron undergo when ceramic bodies are subjected to firing.

(*v*) Self-glazed clino-Enstatite bodies, begun in 1950, completed in 1951, Published in Journal of Indian Chemical Society. (High frequency ceramic body having the power of developing glossiness has been prepared.

2. Dr. H.N. Das Gupta, and Sri J. N. Chakravarty, Lecturer Estimation of chlorine in organic combination in the total coal substance, begun in 1950, completed in 1951. Published in Journal of Indian Chemical Society. (A simplified method has been evolved for estimating chlorine in organic combination in Coal.)

3. Dr. H.N. Das Gupta, and Shri M.R. Bose, Demonstrator, Recovery of Sulphur from Sulpyidic Ores like copper phyrites, Galena and Zinc blende, etc., begun in 1949, completed in 1953. (It has been found feasible to recover about 85 per cent. of Sulphur in the elementary condition without introducing any costly item.)

Physics

1. Dr. J. Dhar (ex) Senior Lecturer in Physics and Mathematics, (*i*) X-ray Investigation of the Para-dihalogen derivatives of Diphenyl, for D.Phil (Calcutta), Published in Indian Journal of Physics Vol. 20, p.153 (1946).(The isomorphous crystals dichlorodiphenyl and difluorodiphenyl were studied by X-ray method. Dimension of the unit cell was found and also the space-group to which they belong.)

   (*ii*) Structure of Diphenyl, for D. Phil. Calcutta Published in Proceedings of the National Institute of Science of India, Vol. XV, No. 1, 1949. (Determination of the structure and confirmation of the same from other data.)

2. S. N. Mitra and Dr. J. Dhar, Studies of the variation of viscosity with temperature of some lubricating oils, begun in July, 1951, Part I is complete and will be sent for publication. (The dependence of Viscosity of the lubricating oils like Mobile B. B. Oil, Crank-Chamer Oil, tachoemeter Oil, Castrol AA motor oil, etc., on temperature was studied with a view to supplying data to the lubrication engineer.)

3. Dr. J. Dhar (ex) Senior Lecturer in Physics and Mathematics, X-ray studies in Indian Coals—Part I, Published in Proc. of the National Institute of Science in India, Vol. 8, p. 127 (1942). (Powder photographs were taken and spacings for the diffraction bands were calculated.)

CENTRAL DRUG RESEARCH INSTITUTE, LUCKNOW

Botany and Pharmacognosy

Progress of work: This Division has undertaken to (*a*) compile a brochure on Indigenous drugs of India and (*b*) the Indian Pharmaceutical Codex. The object of undertaking such a work is to bring order in a field of study which was in a confused state and would also serve as a guide to future productive and integrated research in the field of indigenous drugs by bringing in many data, such that the medical and pharmaceutical professions can effectively use the material given in then in modern scientific therapeutics.

While the details of 200 drug have been written up in (*a*) the work on Indian Pharmaceutical Codex has been completed and in a short time will be available as a printed brochure for ready reference.

Side by side with the above project, the Division has actually set up a Herbarium consisting of 2050 medicinal plants for identification purposes and is actually assisting the various organisations in the state in identification of plants, advising on cultivation, etc.

Medicinal Chemistry

Progress of work: This Division has undertaken work on both (*a*) Phytochemistry—plants reputed to be efficacious in indigenous systems of medicine and (*b*) Synthetic in the preparation of a number of compounds useful as amoebicides, antimycobacterial and neuro-muscular blocking agents.

An alkaloid of therapeutic activity—almost equal to d-tubocurarine has been isolated from Cissampelos pareira Linn. Work on other medicinal plants is on hand.

Biochemistry and Biophysics

Progress of work: Enzyme inhibition studies and elucidation of the mode of action of antibiotics, are in progress. The work has been undertaken from 2 aspects (*a*) applied and (*b*) academic.

On the applied side, (1) a test medium for the assay of the antibacterial activity of drugs has been prepared from locally available ingredients. This will possibly dispense away with the necessity of importing the ready made medicine by hospitals and institutions interested in the work. The utility of the medium for the production of sera and vaccines is being studied.

(2) Work on the preparation of peptones from agricultural wastes like the oil seed cakes.

(3) Semi-large scale preparation of substitutes for lecithins from plant sources and comparing the nutritive value of these preparations with egg lecithin.

(4) Process have been worked out for the preparation of highly active diastatic and tryptic enzymes of bacterial origin using the growth purposes bran and oil seed cakes. The enzyme prepared is under test for therapeutic application.

(5) An antibiotic active against the common dysentery bacteria and allied organisms has been prepared from B. subtills group. The toxicity and chemistry of the drug has been undertaken.

On the Academic side, (1) Investigation on enzyme inhibition by antibiotic have been extended to respiratory enzymes. The antibiotics have been shown to exert a kind of non-specific inhibition on many of the enzyme systems studied. The significance of these results in explaining the mode of action of these drugs as also in opening up new path ways for synthesis of chemotherapeutic agents is being studied.

(2) In order to have a rational approach to the Chemotherapy of cholera, a systematic investigation of the enzyme make up of the organism responsible for the disease has been undertaken. Enzymes involved in the liquefaction of gelatin, utilisation of amino acids of general respiratory processes have been studied.

(3) The investigation on enzymes has been extended to the general metabolism of the organism. This would also throw light on the mechanism of reactions by which the pathogen derives energy and material for growth from its foodstuffs. This is expected to lead to some idea of the nature of pathogenesis of cholera.

(4) With a view to standardising a procedure for the routine assay of the blood regenerating activity of liver extracts and like preparations, experimental lead anaemia has been successfully produced in rats by intraperitioneal administration of varying doses of lead acetate. The effect of

Vitamin B12, whole liver extract and certain fractions isolate from liver on this anaemia is beig studied as also the mechanism by which lead brings about the anaemic condition in the rats.

(5) Several local soil samples are being screened for isolation of antibiotic producing molds.

(6) Chromatography—which is an extremely useful analytical tool is being used for identification of organic acids, sugars, enzymes as also the metabolites of various nutrients produced by V. cholera.

Microbiology and Parasitology

Progress of work: Standards have been worked out for evaluation of drugs experimentally in animals. These standards are now being applied for the animal testing of the drugs prepared in this Institute.

Certain chemicals bring about chemical changes in cholera germs. One such group of chmicals in the Rosaniline dyes, render them comparatively harmless. The effects produce by them are being studied with the intention of applying the findings to the treatment of cholera for which no specific treatment has yet been established.

Intestinal diseases resembling dysentery from which usual causative organisms for dysentery cannot be isolated are not uncommon in this country. Work is being carried out in this Laboratory to find out the cause or causes for such diseases.

Methods have been worked out for the testing of insoluble drugs and oil in the test-tube.

Pharmacology and Chemotherapy

Progress of work: Pharmacological investigations on the active principles isolated from Cissampelos pareira Linn, Picrorhiza kurroa, Nardostchgs jatamanshi, Luffa ammara, etc., and a number of derivatives of N.N.'-bisalkyl N.N.' Occamethylene bis-preperidinium dihalides which are supposed to possess anticurariform activity, have been taken up.

Detailed studies of the antispasmodic activities of the compounds synthesised in the Division of Medicinal Chemistry are in progress.

Experimental Medicine

Progress of work: Pathogenesis of vitiligo is being studied. Biopsy studies have now revealed that melanin is completely absent in the leucodermic patches of patients.

Studies in the response to the action of ultraviolet ray therapy and nicotinic acid treatment are in progress. The minimal erythermal dose of the leucodermic skin is observed to be higher than that of normal, both in pigmented and depigmented areas.

CENTRAL GLASS AND CERAMIC RESEARCH INSTITUTE

1. Atma Ram, B.V. J. Rao, K. D. Sharma and Y.P. Varshney, (*i*) Studies on glass raw materials specially glass making sands. (This is a long range work in which samples of sands and such raw materials from different localities are received from time to time for examination in the original state as also after different methods of processing or beneficiation with a view to make them suitable for different types of glass manufacture.)

   (*ii*) Foam Glass. (The work relates to the development of a process for the manufacture of foam glass or multi-cellular glass which may find good use for heat and sound insulation purposes as for example in the refrigeration industry.)

2. Atma Ram, S. C. Majumdar, K. D. Sharma and Y. P. Varshney, (*i*) Use of naturally occurring Salt Cake in India for glass manufacture. Published in Proceedings of the Indian Science Congress, January 1952. (Naturally occurring salt cake is extensively found in Rajasthan and numerous trials were made to determine the best conditions as to the use of such natural salt cake as a partial substitute for Soda Ash in glass making with a view to introduce its use in Indian glass factories.)

   (*ii*) Signal Glass. (The work relates to the development of suitable glass compositions for making signal glasses for railways and signalling installations. The conditions for the development of colour specially of selenium and copper red glasses have been studied and signal lenses prepared for trial in railway yards under actual working conditions.)

   (*iii*) Glass Electrodes for pH meters. (Suitable glass compositions for making glass electrodes are being studied and electrodes made from such compositions tested for electrical resistance, etc.)

3. Atma Ram, S. P. Krishnaswami, P. Roy and Y. P. Varshney, Standardisation of Glass Containers, Published in Proceedings of the Indian Science Congress, January, 1952.

   (*ii*) Ink Bottles, (Paper sent for publication to the Journal of Scientific and Industrial Research). Inks and ink bottles of Indian as well as foreign manufacture were studied and suitable glass compositions for making ink bottles recommended so that complaints regarding the deterioration of Indian made inks due to alkalinity of the glass containers may be removed.)

(*iii*) Glass Containers for Distilled Water, Pharmaceutical preparations etc., (Glass compositions for making containers for distilled water are being studied and it is proposed to take up each type of containers one by one.)

4. Atma Ram, J. C. Banerjee, S.B. Roy, and Y.P. Varshney, Studies on Indian Talcs, Published in Proceedings of the Ind. Science Congress, January, 1952, and in Journal of Scientific and Industrial Research—August and September 1952. (28 samples of Indian Talcs obtained from different localities were studied in detail. They were examined and chemically analysed, and some other physical properties, such as, P. C. E., thermal expansion, etc., determined with a view to establishing their suitability for use in ceramic industries.

5. J. C. Banerjee, D. N. Nandi and Y. P. Varshney, Sand Lime Bricks, Paper sent for publication to the Journal of Scientific and Industrial Research. (Trial bricks were made using waste lime obtained as a bye-product in the cetylene gas industry, under different conditions of pressure autoclaving, etc., and their properties determined in order to show that such waste lime can be advantageously used for making such bricks.)

6. Atma Ram, Y. P. Varshney and S.S. Verma, (*i*) Resistor Coat Enamels. (Compositions of enamels for making enamel coated wire wound resistors have been developed and a suitable process of application of such enamesl worked out to give satisfactory results. Work on resistors of low ohmic value has been carried out so far and it is being extended to resistors of high ohmic value.)

(*ii*) Cast Iron Enamels. (Various compositions of enamles of white, black, green and red colours for single-coat and double-coat application on cast iron have been developed and their behaviour after application studied.)

(*iii*) Special Enamel Compositions. (Enamel compositions without the use of certain imported raw materials, supply of which may be cut off in an emergency, *e.g.*, Borax, cryolite, cobalt oxide, etc., are being developed so that they may be made from entirely indigenous materials.)

(*iv*) Ceramic Colours. (With a view to produce on-glaze and underglaze colours for use in the ceramic industry in India recipes an compositions for different colours have been worked out and successfully tried in the laboratory as well as on an industrial scale. Such colours are now bing made in larger quantities.)

(*v*) Better Class Saggars. (Saggars used in Indian factories at present give a very short life. In order to make better saggars which will give a longer life, various compositions using fireclays from different localities have been studied in detail. Promising compositions have been made into saggars and after succeessful laboratory trials sent to the industry for testing. Results obtained have been very encouraging.)

(*vi*) Manufacture of Chemical Porcelain. (Laboratory porcelain hitherto imported in the country has been successfully produced from raw materials available in the country. The samples have been examined by several chemical laboratories in the country and found satisfactory.)

(*vii*) Survey of Clay deposits of the country suitable for Ceramic industries. (The work is being done in collaboration with the Geological Survey of India, because information on the availability of this important raw material has not been available. The Geological Survey of India is doing the field part of work and the Institute studies the properties of the samples and their utilization. About 800 samples have so far been examined and about 70 have been found promising for further study. Work is in progress.)

(*viii*) Manufacture of Automobile Spark Plugs. (Experiments are being conducted to examine the possibility of making atomobile sparking plugs of 14 m.m. size using raw materials available in the country.)

NATIONAL CHEMICAL LABORATORY, POONA.

Biochemistry

1. Mansa Ram, Microbiological Assay of amino-acids.

2. B.V. Ramchandran, (*i*) Preparation of arginine from oil cakes:

   (*ii*) Estimation and preparation of Lysine from oil cakes.

3. Y. N. Trehan, Role of Dicarboxylic amino acids in Haemopoeisis:

4. S. D. Ambegaokar and K. Chandra Menon, Under I. C. M. R., Physiological Eeffcts of Dietary Protein.

5. J. C. Sadana, (*i*) Preparation of Protein-Carotene Concentrates.

   (*ii*) Production of sulphur and methane by anaerobic digestion of biological wastes.

6. Gurdas Singh, Preparation of Heparin.

7. I. J. Babbar, (*i*) Pectinase from micro-organisms.

   (*ii*) Analyse from Micro-organisms.

8. Kartar Singh, Glucose oxidase of moulds.

9. S. S. Subramanium, Proteases of micro-organism:

10. C. Siva Raman, Synthetic peptides in relation to enzyme action and bacteriostasis.

11. P. S. Krishnan, Apyrase, Pyrophosphatase and Metaphosphatase of P. chrysogonum:

12. V. Bajaj, Enzyme in Mould Spores.

13. V. Jagannathan, Metabolism of C1 compounds.

14. E. K. Narayanan, Papain Digestion of Natural Proteins.

15. V. S. Govindarajan, V.S. Krishnamachar, and T.N. Ramchandra Rao, National Collection of Type Cultures.

16. P. N. Rangachari, The Mechanisms of Citric Acid Formation.

17. S. S. Subramanian, (in collaboration with Dr. P. C. Joshi of the Survey and Information Division). Studies on the growth of algae and diatoms in the sand of the Hooghly River bed model at bedakvasin:

18. N. R. Shah, Submerged Fermantations.

19. S. S. Subramanian and V. S. Govindarajan, Fermentability of bagasee hydrolysates.

Organic Division

1. K. K. Chakravarti, Chlorination of toluene and production of benzaldehyde and benzoic acid from chlorinated toluene.

2. C. R. Mitra, Studies in the Nim Products (Melia Azadirachta).

3. J. P. Verma, Oils from oil bearing materials by Aqueous Extraction.

4. A. B. Kulkarni, (*i*) Improvement and modification of sugarcane wax.

   (*ii*) Spectro photometric investigation of quinone imine.

   (*iii*) Synthesis of long chain phthaleins.

5. J. L. Bose, (*i*) Investigation on Solvohol-B.

   (*ii*) J. L. Bose, Geraniol Oil from Palmarosa Oil.

6. A. V. Subaratnam, (*i*) Industrial Utilization of Medhi—Indian Henna (Lawsania alba).

   (*ii*) Investigations on Alangium Lamarkii and taberraemontane dichotama.

7. G. D. Shah. (*i*) Essential oil from Mentha Virids,

(ii) Nicotinic acid amide from nicotinic acid.

8. J. L. Bose and K. K. Chakravarti, Antitubercular drugs:

9. J. L. Bose and N. L. Dutta, Synthetic experiments in V-pyrone series.

10. Subbarao and G.D. Shah, The Micro determination of chlorine by the dichromate method in organic compounds containing nitrogen.

11. A. S. Nagarkatti, (*i*) Constituent of mehdi—Indian Henna.

(*ii*) Synthesis of higher analogues of fluorescein.

Oils and Fat Section

1. J. S. Aggarwal and S. C. Gupta. Products from Kamla Seed Oil.

2. J. S. Aggarwal and S. C. Sethi, (*i*) Stabilization of edible fats by spices and condiments.

(*ii*) Chemical analysis of the seed oil from Bencricase cerifera (Petha).

3. J. S. Aggarwal and D. S. Gupta., 10-11-Undecylinic acid from Castor Oils.

4. Hydrogenation of castor oil: J. S. Aggarwal and S. S. Gupta.

5. J. S. Aggarwal and H. H. Mathur, Chemical Examiation of the seed oil of trichsanthes dioica Roxbe.

6. J. S. Aggarwal and M. M. Mathur, Baking enamels from cashew shell liquid.

7. J.S. Aggarwal and M.M. Basin (i) Isolation of Nickel and fats from spent nickel Catalyst.

(ii) Chemical examination of the Castor oil gel.

8. J. S. Aggarwal, Colouration of vanaspati.

9. J. S. Aggarwal and P. G. Sharma, Air drying wrinkle finish coating compositions.

Physical Chemistry

1. Mrs. E. W. Aggarwal, The McBain Baker sorption Balance.

2. S. L. Aggarwal, N. R. Sanjana, Phase Studies of the System Sodium Laurate-Sodium Chloride Water.

3. Mrs. S. Dasgupta, (*i*) Solubilization

   (*ii*) Investigation of a clay sample from Wadala.

4. Miss S. B. Kulkarni, Conductivity of Aqueous solutions.

5. B. R. Y. Iyengar and Miss S.B. Kulkarni, Determination of Osmotic Coefficients.

6. Hiralal (*i*) Electeophoresis of Soap solutions.

   (*ii*) Electro phoresis of Dattura Mosaic Virus Protein.

7. K. P. Sinha and J. S. Gujral, Photographic Gelatine.

8. Lakhbir Singh, K. S. Sonni, and B. G. Zambre, Construction and Maintenance of Instruments.

9. A. B. Biswas, Physico-Chemical Studies on complex formation.

10. B. R. Y. Iyengar, Spinning top ultracentrifuge.

Chemical Engineering

1. H. K. Joshi, G. V. Potnis and M. M. Uppal Gelatine.

2. S. G. Bedskar, Aluminium Chloride.

3. J. Gedeon, and M. Goswami, (*i*) Nicotine.

   (*ii*) Saponin.

4. S. L. Shastry. (*i*) Castor Oil.

   (*ii*) Fludized calcination of lime stone.

5. D. J. Mehta Chlorination of Ilmenite and Rutile ores.

6. N. B. Patel, D. J. Mehta, S.L. Shastry and F.A. Kinsl, Diacalcium Phosphate.

7. A. M. Desai, Chlorination of Rubber.

8. K. S. Gill, Chlorination of Toluene.

Inorganic

1. M. U. Pai, Ammonium sulphate from Epsom salt (to save sulphuric acid).

2. S. O. Shukla, Titanium dioxide by hydrolysis of chloride.

3. S. O. Shukla and M.M. Singh, Titanium dioxide from Bauxite sludge.

4. C. K. N. Nair and A. K. Dasgupta, Germanium.

5. G. T. Gadre, Dicalcium phosphate.

6. K. Sashadri, Hydrogen peroxide through Anthraquinones.

7. M. M. Singh, and M. Shankar Dass, Inorganic Chromatography.

8. A. K. Dasgupta, Analytical methods for rare elements.

9. J. Gupta and K. S. Rajan, (i) Zirconium from Zircon sands.

   (ii) Titanium chloride by Electro-reduction.

10. S. S. Moosath, Processing of Monazite.

Plastics and Polymers

1. P. P. Reddy, (i) Battery containers from indigenous asbestos.

   (ii) Synthetic fibers from sebacic acid.

2. S. L. Kapur, (i) Chain transfer in solution polymerisation of satyrene.

   (ii) Laminates.

3. S. L. Bafna and H. A. Shah, Synthesis of Cation exchange Resins.

4. S. L. Kapur and K. K. Sarin, (i) Synthetic coatings from urea and allied resins.

   (ii) Oil-modified alkyds.

5. K. K. Sarin, Degumming of ramie.

6. J. B. Pande, Hydrohalogenation of rubber.

7. C. S. Ramakrishnan, Chlorination of rubber.

8. J.B. Pande and C.S. Ramakrishnan, Ozone absorption of natural rubber.

9. J. B. Pande and N. V. C. Rao, Latex impregnation of Textile Belting.

10. C. S. Ramakrishnan and N. V. C. Rao, Reinforcement of latex with Phenolic-resins.

11. N. V. C. Rao, Polymers from 1, 2 hydroxy stearic acid.

Survey and Information

1. Information Service
   (*a*) K. G. Mathur and M. M. Sahani, Industrial.
   (*b*) P. C. Joshi, Botanical.
   (*c*) S. R. Guha, Commercial.

2. K. G. Mathur and C. D. Dave, Industrial Demonstrations.

3. K. G. Mathur and D. K. Shastri, Carbon Blacks.

4. J. V. S. Ramanjeneyulu, Abstracts for Atomic Energy Commission.

5. P. C. Joshi, Cultivation of plants for experimental purposes.

FUEL RESEARCH INSTITUTE JEALGORA

Coal Washability Studies by the float and sink, froth flotation, cyclone and heavy medium processes; Breakage and Grindability of coals; Pressurized Combustion of Powdered Coal; Low Temperature Carbonisation by various methods including the Fluidization technique; Coal Constitution; Coal Tar Investigations; Hydrocarbon Synthesis by the Fischer-Tropsch Process; Gasification of Coal; Studies in Surface Chemistry and the natural moisture of Coals; Lignite Investigations; Coal Petrography Studies; The Sampling and Sizing of Coals; Studies in (*a*) Fluidisation, (*b*) Flow of air through broken coal and (*c*) Pneumatic conveying of coal; Desulphurisation of High Sulphur Coals; The Fusibility of Coal Ash; Recovery of Cyclopentadiene, Coumarone, Indene, etc., from Cokeoven gas and tar and preparation of resins therefrom; Cyanogen compounds in Coke oven gas; Preparation of Ion-Exchange compounds; Studies on Heat of Wetting of coals; Adsorption of Moisture in Coal; Bomb Calorimetry; Determination of Phosphorus, Nitrogen, Fluorine, etc.; Standardization of various methods for the Determination of Carbon and Hydrogen; Water of Hydration in the Mineral matter of coal; Preparation of Standard Sand for Caking Index Determination from Indigenous Sources; Ashless Coal and Colloidal Fuel; Direct Determination of Oxygen in Organic Compounds; Coal Carbonisation Studies; Powdered Coal Burner; Spontaneous Combustion of Coals; Concentration of Pyrites in Nowrozabad Coal; Desiccants from Coal; Electrical Conductivity of Coal and Coke; Spectroscopic Determination of Phosphorus in Coal ash; Preparation of Active Carbon from Coals and Lignites; and Briquetting.

Scientific Investigations Completed

Electrical Conductivity of Coal and Coke; Spectrographic Determiation of Phosphorus in Coal ash; Effect of the addition of coal-coke dust to coke-oven coal mixture on the coke quality; Preparation of Active Carbon from coals and lignites, Desulphurisation of high-sulphur coal by the action of industrial gases; Experiments on the breaking characteristics of coal; Mehods for the determination of Carbon content in minerals high in sulphur (upto 50 per cent); Studies on the micro-flora of the Samla and Purushottampur Seams, East Raniganj Coal field, and their usefulness in the correlation of the seams; Production of Coumarone-Indene Resins from Heavy Naphtha; Design of a Pneumatic Feeder; Effect of added water and Super-heated steam during carbonisation on the yield of Tar and Taracids; Kinetics of Hydrolysis of starch to glucose by ion-exchangers; Coking characteristics of different coals and their blends (undertaken on behalf a neighbouring coke plant) ; and Effect of humidity on oxygen absorption and CO_2/CO ratio in gaseous products of oxidation at 50 °C. with Nowrozabad Coal, etc.

New Investigations in Hand

Precise Calorimetry ; Synthesis of hydrocarbons by Bergius Process of coal hydrogenation; Preparation of road tar emulsions from Indian Coal tar Determination of sulphur by Combustion method ; Determination of sulphur by Bomb;Eschka method ; Determination of specific gravity of coal with different liquids; Kinetics of water vapour adsorption on coal; Effect of humidity on oxidation of different ranks of coal ; and Absorption Spectra of Coal-tar fractions, etc.

NATIONAL METALLURGICAL LABORATORY

Jamshedpur-7

1. Production of Nodular Cast Iron and a Study of Nodularisation.
2. Study of the Properties of Various Foundry Moulding Sands available in India.
3. Study of Aluminized Steels.
4. Preparation of Aluminium-Silicon Alloys by thermal Reduction of Silica by Aluminium.
5. Study of Abnormality in Al-Bearing Plain Carbon and Alloy Steels through Pack and Gas Carburisation.
6. A Study of the Preparation of Metal Powders.
7. Study of Austenite Decomposition—Bainite.
8. Study of Austenitic Grain Size Control in Plain Carbon and Alloy Steels.
9. Manufacture of Low-Carbon Ferro-Chrome.
10. Electrolytic Polishing and Etching.
11. Beneficiation of Low Grade Manganese Ores by Thermal Process.
12. Production of Electrolytic Manganese.
13. Deposition of Metalson Non-metals with Nickel as the Bonding Layer.
14. Brass Plating from Non-Cyanide Baths.
15. Chromium Plating on Aluminium and Aluminium Alloys.
16. Production of Beryllia.
17. Reduction of Manganese Dioxide by Glucose, Molasses, Sawdust, etc. in the presence of 2 per cent. Sulphuric Acid.
18. Electrolytic Separation of Nickel from Silver Refiner Waste Liquor.

19. Thermal Decomposition of Manganese Sulphate.

20. Investigations on the Estimation of Magnesium in Nodular Cast Iron.

21. Rapid Method of Estimation of Beryllium in Beryl.

22. Reduction of Titanium Tetrachloride for the Production of Titanium.

23. Studies on Corrosion—Corrosion Inhibition for Steels.

24. Electrolytic Production of High Purity Manganese Dioxide.

25. Spectrographic Analysis.

26. Beneficiation of Low-grade Pyrites from Wynaad, Nilgiris.

27. Beneficiation of Low-grade Chrome Ore from Dodkatoor, Mysore.

28. Beneficiation of Low-grade Chrome Ore from Arsekere, Mysore.

29. Beneficiation of Low-grade Wolfram Ore from Degana, Rajasthan.

30. Beneficiation of Pyrite from Karwar, North Kanara, Bombay.

31. Beneficiation of Low-grade Graphite Ore (Plumbago 'A' quality.)

32. Concentration of Low-grade Uranium Ores.

33. Beneficiation of Low-grade Manganese Ore from Tirodi Mines, Madhya Pradesh—(Joint Investigation of the N. M. L. and the Indian Bureau of Mines).

34. Beneficiation of Low-grade Chrome Ore from Talur, Mysore.

35. Production of Sillimanite Refractories from Travancore Beach Sands.

36. Production of Carbon Refractories from Indigenous Raw Materials.

37. Production of Silicon Carbide Refractories.

38. Production of Super Basic Refractories Utilizing Chaibassa Magnesite-Talc Rock.

39. Suitability of Indigenous Magnesium-Silicate Rocks for Production of Basic Refractories.

40. Production of Superduty Insulation Refractories.

41. Development of New Permanent Magnet Alloys of the Iron-Manganese-Aluminium type.

42. Preparation and Study of Manganese Aluminium Steels as a suitable Soft Magnetic Material.

43. Thermodynamics of Austenite.

44. Study of Austenite Decomposition—Pearlite.

45. Study of the High Temperature Air-Corrosion of some Manganese Aluminium steels.

46. Study of the Effect of Thermal, Mechanical and Ultrasonic Treatment on the Magnetic Properties of some Iron-base alloys with the help of Oscilloscope.

47. Design and Construction of Equipment to measure Internal Friction.

48. Study of Austenite Decomposition—Bainite.

49. Study of the Impact Fatigue Resistance of Structural Steels.

50. A Study of the Fatigue Properties of Structural Steels and Their Notch Sensitivity.

51. Study of Wear Resistance of Railway Wheels, Tyres and Rails.

52. Study of Upper and Lower Yield Points.

53. Dynamic Determination of Elastic Constants and Their Variation with temperature.

54. Study of the Variation of Tensile Properties with Fatigue Cycles.

TATA INSTITUTE OF FUNDAMENTAL RESEARCH, BOMBAY

Cosmic Radiation (Experimental)

(*a*) Under a grant from the Government of India, a project for the measurement of the different components of cosmic radiation at high altitude and a different lattitudes by balloons using the radio-sonde technique was undertaken in 1948. High altitude flights, in which the total and the penetrating component of cosmic radiation was measured up to altitude of 80,000 ft., have been made from Delhi, Bangalore and Poona. The results obtained have been published as research papers in various scientific journals. Further work on the scheme is in progress.

(*b*) To study the inter-action of elementary particles at high altitudes, a series of balloon flights with nuclear photographic plates were made from Bangalore in 1950. This series of experiments was jointly sponsored by the Tata Institute of Fundamental Research and the Rochester University. Professor Peters of the Rochester University came out to India for these flights, in some of which an altitude of 80,000 ft. and above was attained. The results obtained have been published in various scientific journals. Professor Peters has joined the Institute since December 1951, and further work on the scheme is in progress.

(*c*) Study of cosmic ray particles by using Wilson Chamber is also in progress in the Institute. Experiments are also in progress for measurement of life time of mesons.

Nuclear Physics (Experimental)

Work on instruments required for nuclear researchi is in progress. And portable type of radition meter suitable for geological survey of radioactives elements has been completed. Quantity production of these instruments has also been undertaken. Work on scalers, coincidence units and radiation monitors is also in progress. Work is also in progress on ionisation chambers and scintillation counter technique.

Mathematics

Advanced courses of lectures are given every year in the Institute in selected topics in higher mathematics. Research papers by the members of the staff have been published in various mathematical journals. The Institute has also formulated a scheme for publishing monographs in physics and mathematics. The first monograph entitled "Typical Means" by Professor. K. Chandrasekharan of this Institute and Dr. Meenakshi Sundaram has been recently published by the Oxford University Press for the Institute.

Quantum Mechanics and the Theory of Elementary Particles

In addition to the various courses of lectures and seminars given in these subjects every year, research papers by the members of the staff have been published.

INSTITUTE OF NUCLEAR PHYSICS, CALCUTTA

Palit Laboratory

Cosmic Rays

1. N. N. Dasgupta, The Second Maximum of the Rossi Curve, Published in Proc. Nat. Inst. Sci. Ind., 6, 66 (1940).

2. N. N. Dasgupta, and P.C. Bhattacharya, Determination of the Life of the Mesotron, Published in Proc. Nat. Inst. Sci. Ind. 6, 713 (1940).

3. P. C. Bhattacharya, (*i*) A search for the Double Proton, Published in Proc. Nat. Inst. Sci. Ind., 7, 275 (1941).

(*ii*) East-West Asymetry of Cosmic Rays at Calcutta and Darjeeling, Published in Proc. Nat. Inst. Sci. Ind., 8, 263 (1942).

(*iii*) Fine structure in the Directional Intensity of Cosmic Rays at Calcutta Published in Proc. Nat. Inst. Sci. Ind, 8, 273 (1942).

(*iv*) Experiments on the Separation of Low Energy Mesotrons from Electrons, Published in Phys. Rev. Vol. 74, No. 1, p. 38—43, (July 1, 1948.)

4. S. C. Sirkar, and S. K. Ghosh, On the Production of Mesons by Non-ionising Agents in Cosmic Rays, Published in Proc. Nat. Inst. Sci. Ind., 8, 233 (1942).

5. S. C. Sirkar and P. K. Bhattacharya, Instability and Life of Neutrettos Producing Mesons in a Lead Absorber, Published in Journal Science and Culture, 8, 89 (1942).

(*ii*) Evidence for the Production of Mesons by Non-ionising Unstable Particles, Published in Proc. Nat. Inst. Sci. Ind., 10, 175 (1944).

6. S. N. Ghosal, Specific Ionisation of Cosmic Ray Mesotrons, Published in Proc. Nat. Inst. Sci. Ind., 11, 353 (1944).

7. S. K. Ghosh and N. N. Dasgupta, Energy Spectrum of Mesotrons at Low Energies, Published in journal Nature, 156, 83 (1945).

General Physics

1. K. C. Niyogi and J. B. Basumallik, On the Thermal Conductivity of Indigenous Insulating Substances, Published in Ind. Jor. Phys. 16, 241 (1942).

2. K. Ray and N. D. Sengupta, (i) Ultimate Vacuum attainable by Diffusion Pump, Published in journal Nature, 155, 727 (1945).

(*ii*) Comparative Vacua Produced by different Oils in a Diffusion Pump, Published in journal Nature, 155, 727 (1945).

(*iii*) On the Theory of Diffusion Pump, Published in Ind. Jour. of Phys. 19, 138 (1945).

3. K. Ray, Working of Diffussion Pump with Different Oils, Published in journal Science and Culture, 10, 560 (1945).

Instruments

1. N. N. Dasgupta, Counting Systems for the Detection of Charged and Un-charged Particles, Published in journal Trans. Nat. Inst. Sci. 2, 121 (1942).

2. B. M. Banerji, (*i*) A New Pulse Generator Circuit, Published in Ind. Jour. Phys. 19, 75 (1945).

(*ii*) Linear Time Base Using 0A4G Tube, Published in Rev. Sc. Instr., 19, 84 (1948).

(*iii*) On the Variation of A. C. Permeability of Transformer Sheet Steel with D.C. Magnetisation, Published in Ind. Jour. Phys. 22, 265.

3. S. Dattamajumdar, Measurement of High Rotational Speeds, Published in Ind. Jour. Phys. 19, 153 (1947).

4. B. M. Banerji, A. K. Saha, and A. Ghosh, A Versatile Pulse Counting Circuit, Published in Proc. Nat. Inst. Sci. Ind. 12, 173 (1946).

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Roxy Press, New Delhi